The Physiotherapy Review

Vol. XI No. 6

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The encouraging clinical results reported by these early workers in the treatment of paresis, and their predictions that diathermy would ultimately prove quite as valuable in the treatment of other chronic diseases, have led to a considerable amount of investigation and research which elicit worldwide interest.

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REFERENCES:

1. Artificial Fever Produced by High Frequency Currents—Preliminary Report. By Clarence A. Neymann, M. D., and S. L. Osborne, B. P. E., Ill. Med. J., Sept., 1929.
2. Therapeutic Fever Produced by Diathermy; its Application in the Treatment of Paresis. By J. Cash King, M. D., and Edwin W. Cocke, M. D., So. Med. J., March, 1930.
3. The Treatment of Dementia Paralytica with Hyperpyrexia Produced by Diathermy. By Clarence A. Neymann, M. D., and S. L. Osborne, B. P. E., J. A. M. A., Jan. 3, 1931.
4. A New Method of Nonspecific Treatment of Allergic Disease—Preliminary Report. By S. M. Feinberg, M.D., M. L. Afremow, M.D., and S. L. Osborne, B. P. E. Jour. Allergy, II:4:291, May, 1931.
5. Fever Produced by Diathermy: Its Value in Multiple Sclerosis and Other Chronic Diseases. By Wm. H. Schmidt, M. D., and Benj. P. Weiss, M.D. Physical Therapeutics, XLIX:8, Sept., 1931.

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Aids in Muscle Training

By F. J. Gaenslen, M. D.

Of the many varieties of physical therapy, active exercise probably deserves first place because of its wide applicability and because it calls into play the entire neuro-muscular units in a manner approaching normal physiological action. Some ten years ago the writer described the "sling suspension" method of exercise as an aid in restoration of muscle power in infantile paralysis. The method has been employed by us for this condition ever since, and has also been found useful in many other conditions. Briefly, the method consists in supporting the arm or leg to be treated in a sling suspended from overhead, thus eliminating the weight of the extremity as a hindrance during movement. The adaptability to upper and lower extremities, as well as the fact that the method can readily be taught to nurse or mother, makes further mention of the method worth while. It must be admitted that underwater exercise in out-of-door pools or in small tanks has advantages. Here the warmth of the water and the buoyancy, which practically eliminates gravity, as well as the slight resistance of the water to movement of the limb, are important factors. However, swimming pools and special tanks are available to comparatively few, the great majority of patients being forced to do without. Even aside from the question of expense, I am not prepared to say that it would be wise to remove a child from home surroundings and to institutionalize it for a long period of time, provided good cooperation in the home care is possible. Both sling suspension and under water exercises are helpful in allowing the patient to translate even minimal and scarcely appreciable muscle power into active and readily demonstrable motion through a fair arc. The fact that even slight gains are recognized by the increase in range of motion is of great importance in spurring on the instructor and the patient to continued efforts in the long and tedious process of restoration of muscle power.

The method is so simple that it can be employed to advantage in the case of even very young children. Resistance may be added, as indicated, in carrying out the exercises.

In every case in which this type of exercise may be indicated, the physician in charge will have to depend on the physiotherapist to arrange the apparatus for the patient and to teach the mother or nurse the prescribed routine, the program being modified from time to time to meet the varying demands. In the average case of infantile paralysis, because of the long duration of treatment, it is not practicable to have the child brought to institutions daily or several times daily for treatment by skilled physiotherapists. Neither is it practicable to have the skilled workers visit the children in their homes as

FIG. 1. SHOWS THE SLING ABOUT THE ANKLE TO ALLOW FLEXION AND EXTENSION AT THE KNEE, THE THIGH BEING FIXED IN EXTENSION BY PATIENT OR INSTRUCTOR. WITH AN ADDITIONAL SLING ABOUT THE KNEE, AND RELEASING THE FIXATION AT THE HIP, THE PATIENT MAY EXECUTE MOVEMENTS IN FLEXION AND EXTENSION OF THE HIP AND KNEE SIMULTANEOUSLY.

often as treatment is indicated. The solution for the case of this type lies in the enlistment of the services of someone in the household, usually the mother. Exercise periods, for the most part, should be brief to avoid fatigue, but they may be, and usually should be, repeated frequently during the day with proper rest periods intervening. The mother, therefore, is the one logical person to carry this out. We have found that the average lay mother requires but a few practical lessons in order to acquaint her with the relatively small number of special procedures applicable in the case at hand. She can be taught to carry this out fairly satisfactorily, even though

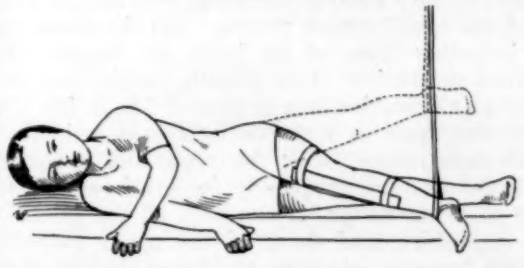

FIG. 2. SHOWS THE PATIENT ON THE SIDE TO ALLOW FLEXION AND EXTENSION AT THE HIP, THE KNEE BEING SPLINTED TO PREVENT BUCKLING.

she does not understand the physiological principles involved. Such a program, of course, requires occasional supervision and correction of errors, also modification from time to time.

In the case of the lower extremity the use of the roller-skate, or rather a single pair of ball-bearing rollers taken from a roller-skate and attached to a shoe, has been found an advantage in facilitating early motion. This contrivance has been found very helpful in fractures of the lower extremity. With the skate under the heel and the lift under the knee, regulated by the patient himself, the gentlest movements in flexion and extension can be

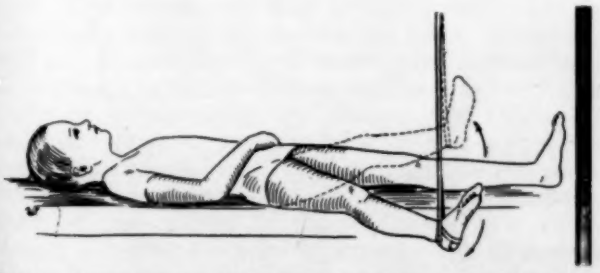

FIG. 3. SHOWS SLING ABOUT THE ANKLE TO ALLOW ABDUCTION AND ADDUCTION AT THE HIP.

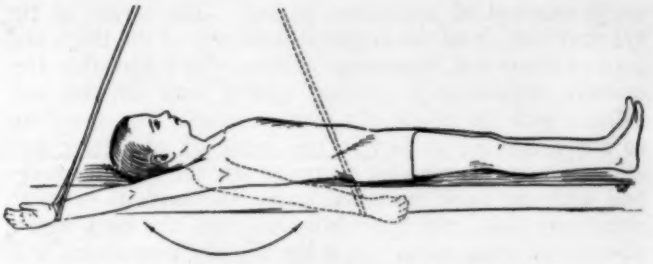

FIG. 4. SHOWS THE PATIENT LYING SUPINE WITH THE SLING ABOUT THE WRIST ALLOWING ABDUCTION AND ADDUCTION AT THE SHOULDER.

executed, just as much assistance being given as the case may require and without danger of injury, if ordinary care is used. Resistance in the shape of push and pull by the mother or attendant may be added. This arrangement provides for flexion and extension of both knee and hip. Abduction and adduction are provided for by turning the wheels, fixed to the shoe, at right angles. This

FIG. 5. SHOWS THE PATIENT IN SITTING POSTURE WITH SLING ABOUT THE WRIST, THE ELBOW BEING SPLINTED TO PREVENT MOTION AT THIS JOINT; THE ARM MAY BE SWUNG FORWARD AND BACKWARD FROM THE SHOULDER.

type of exercise will be found useful in practically all types of fracture of the lower extremity, including especially fracture of the patella and fracture of the neck of the femur where special care is indicated. There is probably little doubt that some potentially good results, after fracture of the neck of the femur, are ruined by too

FIG. 6. SHOWS PATIENT SEATED WITH THE ARM AT THE SIDE, THE WRIST AGAIN SUPPORTED WITH THE SLING TO ALLOW ROTATION MOVEMENTS AT THE SHOULDER.

early removal of apparatus in bed. The strain at the fracture site, from the constant tendency of the thigh and foot to rotate out, represents a force which probably frequently results in a gradual giving way of the soft callous, with the result of a fibrous union. The directions to move the leg in bed in the sense of abduction and adduction, or worse still, to try to lift the heel from the bed with the knee extended, cause tremendous force to come into play, which tends to angulate the neck into a position of coxa vara. In a leg slightly edematous, still greater caution is indicated because of increased weight. This internal stress on the bone, due to muscle pull, is very considerable, as Carey has demonstrated. It is more than likely that attention to details of this character would help to cut down the percentage of failure in fractures of the neck of the femur, and to reduce the healing period in this as well as other fractures of the lower extremity.

Other conditions in which sling suspension may be employed with benefit include spastic paralysis, especially of the lower extremities, and chronic infectious arthritis. In spastic paralysis it has frequently been found of advantage to attach a heavy weight to the sling, transforming it essentially into a pendulum with heavy weight. The patient's arm or leg is placed in the sling and the pendulum is put into motion by the instructor, the patient being taught to continue the swinging with and without resistance. It is felt that a good start may be made in this manner in developing the sense of rhythm and in the teaching of gentle coordinate movement.

FIG. 7. SHOWS PATIENT SEATED WITH ARM ABDUCTED TO HORIZONTAL LEVEL, THE SLING SUPPORTING THE WRIST ALLOWING FLEXION AND EXTENSION OF THE ELBOW.

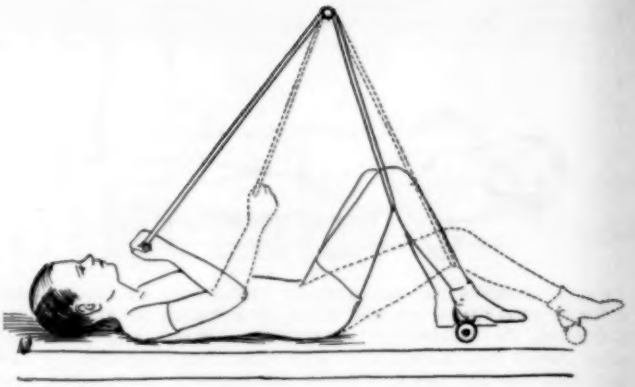

FIG. 8. SHOWS SLING UNDER THE KNEE SUSPENDED FROM A PULLEY ATTACHED TO AN OVER-HEAD BAR AND CONTROLLED BY THE PATIENT. THE ROLLER ATTACHED TO THE HEEL MAY BE ROTATED THROUGH 90°. A LARGE PIECE OF BEAVER-BOARD MAY BE PLACED ON THE BED TO PROVIDE A SMOOTH SURFACE.

In arthritis, active motion within the pain-free range is without doubt a factor of considerable importance in maintenance of normal physiological joint activity. The alternate contraction and relaxation of muscle groups and their antagonists must be of help in improving the circulation. As the muscles contract the lymph vessels and veins are compressed, the blood and lymph being hurried in the proximal direction. As the muscles relax these vessels are filled from the capillary side, the capillary system in turn drawing on the arterial supply. In this manner capillary stasis is overcome, and definite acceleration of the blood stream results. All the tissues of the part, including those of the joint, are benefited by the improved circulation. Cell growth, repair, and defense, as well as elimination, are enhanced. It is felt that the use of the skate in multiple infectious arthritis is of special value, since, with the apparatus in place, the patient can exercise frequently for brief periods, always in the pain-free range. Practically all the joints of the lower extremity, and those of the upper extremity as well, are brought into play, the latter through the rope and pulley hand control.

In conclusion it must be emphasized that every case, of whatever type, must be studied carefully and a physiotherapeutic program mapped out to meet the individual requirements, and also that the simple measures outlined here are merely aids in the rehabilitation program.

Milwaukee, Wisconsin.

Massage

By Ralph Pemberton, M.D., Philadelphia, John S. Coulter, M.D., and Harry E. Mock, M.D., Chicago

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Massage is one of the oldest physical therapy procedures known to the medical profession. Hippocrates about 430 B. C., in discussing the treatment of a dislocated shoulder, following reduction, said: "And it is necessary to rub the shoulder gently and smoothly. The physician must be experienced in many things, but assuredly also in rubbing; for things that have the same name have not the same effects. For rubbing can bind a joint which is too loose and loosen a joint that is too hard. However, a shoulder in the condition described should be rubbed with soft hands, and above all things gently; but the joint should be moved about, not violently, but so far as it can be done without producing pain."

It is fitting, therefore, that a manual on physical therapy should start with massage. In this day when so much has been written concerning various forms of physical therapy requiring expensive machines and apparatus for its application, many of the profession are apt to overlook the fact that one of the greatest physical measures lies in the hands of a well trained technician, intelligently directed by a physician. Massage, passive and active exercise, muscle training exercises and the application of heat represent practically the only physical therapy needed in the great majority of medical or surgical conditions.

Physiology of Massage

Explanation of the influence of massage has been long in forthcoming, although use of the measure itself, as already noted, goes back to the earliest periods of history. Clinical medicine and successful forms of treatment often run ahead of precise knowledge of the premises from which they arise. It becomes important, however, and even necessary, sooner or later, to acquire such precise knowledge. This is eminently the case with that measure of therapy known as massage. Not only is knowledge of the nature of the influence which massage exercises desirable on physiologic grounds, and because of the light thus incidentally thrown on pathologic processes favorably affected by it, but especially today is it important to refer, if possible, the alleged benefits from this measure to definite facts and principles rather than to clinical impressions, with the aim of counteracting the obloquy that misuse of massage has, in some part, cast on it. There is probably no other measure of equal known value in the entire armamentarium of medicine which is so inadequately understood and utilized by the profession as a whole. Although the clinical results of massage are undoubted and often graphic, it has been and still is difficult to determine the factors that are most directly operative.

A great deal of investigative work was carried out in the latter part of the last century, more or less contemporaneously with the development of the so-called Swedish school of physical therapy, and in 1910 Rosenthal[1] reviewed the literature to date in a monograph on the scientific basis of massage. Since that time, however, more modern methods of physiologic and chemical investigation have been developed, and the subsequent literature from this standpoint has not been extensive. Most of the data to be derived by studies along these lines are of a negative nature, but they serve nevertheless to delimit the problem in a fairly satisfactory manner.

A number of the investigators of twenty or more years ago observed an increased excretion of urinary nitrogen following massage. Bendix[2] and Voight[3] carried out more carefully conducted experiments in which the food intake of the subjects studied was controlled. These workers independently observed an increased excretion of nitrogen during the twenty-four hour period in which massage was administered, and a heightened excretion of urinary nitrogen continued decreasingly for several days after the administration of massage, before it returned to the previous level. According to Eccles[4] there takes place an increased output of uric acid on those days during which massage is given. In line with these indications of the influence of massage on metabolism were the observations of Leber and Stüve,[5] who reported an increase of from 10 to 15 per cent in the oxygen consumption and carbon dioxide production following either general or abdominal massage. Diuresis has been a consequence frequently observed by many workers,[6] and this diuresis may persist for several days.

In the attempt to ascertain more accurately the specific influence, if any, of massage on certain factors in metabolism, an effort was made by one of us (R. P.) and his associates[7] to determine the rate of excretion of several other constituents of the urine. For this purpose the hydrogen ion concentration, titratable acidity,

[1]Rosenthal, Carl: Die Massage und ihre wissenschaftliche Begründung, Berlin, 1910.

[2]Bendix, B.: Ztschr. f. klin. Med. 25: 303, 1894.

[3]Voight, O. W.: Inaug. Diss., Halle, 1896.

[4]Eccles, A. S.: Practice of Massage, London, 1898.

[5]Leber and Stüve: Berl. klin. Wchnschr. 33: 337, 1896.

[6]Herxheimer, H.; Kost, R., and Wissing, E.: Ztschr. f. d. ges. phys. Therap. 33: 167-182 (June 30) 1927. Hirschberg, R.: Bull. gén. de thérap. 113: 241, 1887. Pemberton, Ralph; Cajori, F. A., and Crouter, Caroline Y.: The Physiologic Effect of Massage, J. A. M. A. 83: 1761 (Nov. 29) 1924.

[7]Cajori, F. A.; Crouter, Caroline Y., and Pemberton, Ralph: The Physiologic Effect of Massage, Arch. Int. Med. 39: 281 (Feb.) 1927.

sodium chloride, inorganic phosphorus, total nitrogen, creatinine and creatine were noted. The increased volume of urine noticed by others was again observed, especially after abdominal massage, and occasionally there was a true diuresis. It is probable that this diuresis is due in part to the abdominal pressure exercised, as Griffith and Hansell [8] found diuresis to occur following abdominal pressure alone, and Bazett and his associates [9] observed it following pressure of water on the abdomen during immersion of the body in a bath. Herxheimer, Kost and Wissing,[9] however, believed the diuresis to be referable to a direct effect on the muscular tissues, either mechanical or by way of the nervous system. It is probable that the direct muscular influence and the abdominal influence are independent.

In the work of one of us [7] the excretion of acid was not observed to be altered after massage, and there was no disturbance of the acid-base equilibrium of the blood. An increased rate of excretion of nitrogen, inorganic phosphorus and sodium chloride was observed more frequently following massage than during the control period. The rate of excretion of creatinine was apparently not influenced, and in no case was creatinuria induced. Kost [10] and Schneider [11] found, in contrast to the earlier work of Leber and Stüve,[6] that oxygen consumption was not influenced by the customary forms of massage unless associated movement was induced.

In general, therefore, the results described suggest a broad and generic influence, and that massage has no immediate or large effect on general metabolism per se. The cumulative effect which massage nevertheless exercises on various metabolic processes probably lies, as Rosenthal believed, in its mechanical influence on the circulation of the parts concerned.

Attention should be directed to other studies which substantiate this general point of view and furthermore make it possible more nearly to define the general nature of the influence of massage. Reference to this work will also be made under a discussion of the influence of heat, but it is appropriate again to direct attention to the matter at this point.

It is generally recognized that massage achieves some of its best results, especially over limited areas of the body, when preceded by exposure of the given part to external heat. The complementary action of these two measures is therefore worthy of attention. Furthermore, it is generally recognized that massage, exercise and exposure to heat constitute a triad of measures or agencies which more or less replace or complement one another in the treatment of certain pathologic conditions, such as trauma to joints or muscular tissue and rheumatoid or arthritic processes in them. In a study of the respective physiologic influences of these three measures, however, certain sharp differences can be detected. With exposure of the whole body to heat, for instance, there takes place an acceleration of the rate of respiration and of the general circulation. One consequence of the increase of respiration is a washing out of carbon dioxide from the lungs. Sweating is also induced, and a small amount of carbon dioxide, together with small quantities of other acid products such as lactic acid, is eliminated through this channel. Salt and some nitrogenous constituents are also carried away in the sweat. The urine normally contains carbon dioxide and various quantities of acid substances, such as phosphates, sulphates and inorganic acids; but, following systematic exposure to heat, the amounts of these substances in the urine are increased.

The net result of these several processes is to romove from the body certain acid radicals, chiefly carbon dioxide, which creates within the body a relative alkalosis. The relative excess of alkali then alters the reaction of the blood, and the alkali itself is in turn eliminated through the sweat and the urine, producing an alkaline swing in each of them.

This general condition of alkalosis of the fluid tissues of the body following exposure to heat is in marked contrast to the results of exercise. Thus, Barr and his co-workers, [12] following the work of Haldane, have shown that actively contracting muscles bring about the production of lactic acid in amounts sufficient to change the reaction of the blood in the opposite direction; namely, toward acidosis. This increased acidity may persist for as much as fifty minutes after an amount of exercise equivalent to 3,500 kilogram meters in three and one-half minutes. This is about comparable to the amount of exercise taken by a man weighing 150 pounds (68 Kg.) climbing 150 steps at the rate of one step a second.

It would appear that massage partakes somewhat of the nature of exercise, but studies from the chemical standpoint show that this is not wholly the case. After massage, given as vigorously as was clinically practicable to individuals unaccustomed to it, there developed none of the evidences of acidosis, such as follows active exercise. There was no increase in the lactic acid of the blood, and the urine showed no constant increase in organic acids, as would have been presumably the case had lactic acid been produced and eliminated in the manner described by Wilson.[13] After massage of considerable severity the hydrogen ion concentration of the blood showed no change comparable in magnitude to that following exercise of the extent mentioned. There took place in some cases a slight decrease in alkalinity, corresponding to changes observed by Barr after very mild exercise. It is to be borne in mind, however, that the massage administered was as vigorous as could be tolerated within therapeutic limits. There was furthermore no change in the percentage saturation of the blood with oxygen, such as follows exposure to heat, and there was therefore no evidence of a heightened rate of circulation. The oxygen capacity rose slightly, though unmistakably, a point that has a significance to be mentioned later.

Massage is accompanied, therefore, by neither the alkaline swing following exposure to heat nor the acid swing following active exercise. The apparent absence of detectable changes in the chemical equilibrium of the fluid tissues adequate to explain the benefits resulting from massage emphasizes the presumable influence of the mechanical factors accompanying and characterizing it. In this connection, Krogh and his co-workers have amply demonstrated the effect of external stimuli on the capillary circulation. Carrier [14] has shown that light pressure produces an almost instantaneous though transient dilatation of the capillary vessels, although heavier pressure may produce dilatation of more enduring nature. Microscopic observation of fields in which only a few capillaries are open, and hence in which only a few can be seen, reveals that pressure of this kind may cause practically all the smaller vessels to become visible

[8] Griffith, J. Q., and Hansell, H. R.: Am. J. Physiol. 74: 16 (Sept.) 1925.

[9] Bazett, H. C.; Thurlow, S.; Crowell, C., and Stewart, M.: Am. J. Physiol. 70: 430 (Oct.) 1924.

[10] Kost, R.: Ztschr. f. d. ges. phys. Therap. 33: 1 (Feb. 18) 1927.

[11] Schneider, E.: Zentralbl. f. Chir. 55: 390 (Feb. 18) 1928.

[12] Barr, D. P.; Himwich, H. E., and Green, R. P.: J. Biol. Chem. 55: 495 (March) 1923.

[13] Wilson, D. W.: Proc. Soc. Exper. Biol. & Med. 21, May 24, 1924.

[14] Carrier, E. B.: Am. J. Physiol. 61: 528 (Aug.) 1922.

because of the blood flow created through them. According to A. E. Cohn,[16] this general response may occur in very young blood vessels that are not innervated and is then apparently a direct function of the intensity of the stimulus. The influence thus exerted on the total quantity of blood flow through a massaged area, and in the direction of sweeping along the stagnant cells lying inactive within it, needs no emphasis.

Further evidence illustrative of such an influence is to be seen in the effects of general massage on the blood count. Mitchell[16] showed in 1894 that in both health and anemia the red cell count is increased after massage. This is especially the case in anemia, in which condition the increase is greatest one hour after treatment, beyond which period it slowly diminishes. Schneider and Havens[17] have also shown that abdominal massage alone will increase the hemoglobin and red cell count in blood taken from the finger at ordinary barometric pressures. These workers have demonstrated that, following acclimatization to altitudes, the extent of such increases diminishes and the increases themselves finally cease. They interpret this finding as due to the lowered barometric pressure, which brings into the circulation many red corpuscles usually contained within closed or inactive areas. Scott,[18] however, believes that concentration of the blood affords the explanation. At all events, the influence of massage in the direction of an increase in the hemoglobin and red cells of the circulating blood is beyond question, whether or not any factors additional to the mechanical influences are operative. The limited but definite rise observed, as already mentioned, in the oxygen capacity of the blood after massage also bears this out. It is difficult, therefore, to escape the conclusion, already mentioned, that an important influence of massage is on the local circulation of the parts treated, and so, more or less, on the circulating fluids of the body as a whole.

In contrasting the effects of active muscular exercise and those of passive muscular exercise in the form of massage, another point of importance emerges. The development of lactic acid in the circulating blood, and hence a systemic acidosis, may follow relatively mild exercise. As pointed out, massage given as vigorously as could be tolerated is probably as nearly comparable in severity to mild exercise as can well be the case in contrasting measures of a different order. Evidences of this severity are to be seen in the fatigue experienced by the subject of the massage. It would therefore appear justifiable to conclude that, whereas lactic acid is produced by contraction of muscle following volitional effort on the part of the individual, it does not arise, at least in significant amounts, as the result of extraneous mechanical stimuli applied to the muscle within the therapeutic limits. This is true also as regards stimulation of the muscles by the faradic current.[19] This conclusion is of importance because it seems to explain the value of massage to the exercised muscles of human athletes and even of horses. This beneficial influence is well known to athletic trainers and is also widely utilized by them in connection with traumatized muscles. Were it not for the fact that massage produces no important additional amounts of lactic acid, its favorable influence on overexercised muscle could hardly be explained. In the absence of any further burden in this regard, changes in the blood supply of muscle brought about by massage permit presumably of more rapid or more thorough removal of the lactic acid already contained within such tissues.

While the more subtle physiologic and chemical changes following massage are difficult of measurement, it is easy to recognize clinically the mechanical value of this agency in returning fluid from the fixed tissues to the general circulation. This can well be seen in a gross way by observing the effect of upward stroking and massage on edema of the extremities following cardiac decompensation, and especially on the edema secondary to the dependent position of the feet sometimes encountered in chronic arthritis. In this general mechanical influence the lymphatics are probably also involved, though the extent of this is difficult of determination.

Another influence of massage should be mentioned from the clinical standpoint, although it would be unwise to make any postulates regarding it. It is generally accepted that at least some of the important phases of carbohydrate metabolism either take place in, or are inaugurated in, muscular tissue, which apparently shares with the liver a leading rôle in this respect. Clinical recognition of this is to be seen in the accepted advocacy of controlled muscular exercise in diabetes. It is difficult to escape the suspicion that, under conditions of muscular atrophy, such as are seen, for example, in advanced cases of chronic arthritis, there can hardly be maintained that balance of general metabolism characteristic of the normal and well muscled individual. However this may be, there can be small doubt that definite clinical improvement occurs in individuals who are the subject of widespread muscular atrophy if the involved muscles are given the benefit of systematic and sustained massage. Improvement in the tone and firmness of the muscle runs roughly parallel with the general clinical betterment and constitutes part of a reconstructive cycle in which the better function, better posture and greater activity thus induced are important factors.

It would be improper to suppose that the general effects of massage on the circulation are brought about through mechanical agencies alone. There can be small doubt that the nervous system contributes under massage, probably through the sympathetic division, to a reflex influence on the blood vessels of the parts concerned. Dilatation of the small vessels following very light stroking affords illustration of the nervous mechanism operative. It is probable, therefore, that vessels within the muscular system or elsewhere are emptied during massage not by virtue alone of being squeezed but also through this reflex action. Because of this, or for other reasons, there seems to be exercised an indirect effect on the system as a whole which may take the form of mild stimulation, mild sedation or exhaustion. Under appropriately controlled circumstances, this influence should be mildly sedative or slightly stimulating but never exhausting.

Finally, as mentioned in the section on the technic and practice of massage, it is important to bear in mind that in inactive persons, such as those confined to bed, massage may compensate for lack of that contraction of the muscles of locomotion on the larger blood vessels that normally contribute to the return of the venous blood to the heart. This influence of massage is available in certain stages of cardiac decompensation, but it is not utilized clinically to the extent that it should be.

While the influence of massage on the end-products

[16] Cohn, A. E.: Read before the Cosmopolitan Club meeting, Rockefeller Institute, New York, March 22, 1930.

[16] Mitchell, J. K.: Am. J. M. Sc. 107: 502, 1894.

[17] Schneider, E. C., and Havens, L. C.: Am. J. Physiol. 36: 380, 1915.

[18] Scott, F. H.: Am. J. Physiol. 44: 298 (Oct.) 1917.

[19] Cajori, F. A., and Pemberton, Ralph: The Nature of the Response of the Muscles to Faradic Stimulation. J. A. M. A. 90: 748 (March 10) 1928.

of metabolism is being discussed, it must be borne in mind that a necessary consequence of dysfunction of muscle tissue, for which massage is often indicated, is the production in the muscle of some of the products of dysfunction. Massage is capable of promoting the removal of some of these substances, as is well exemplified in its influence on the extravasations of blood and other kinds of débris consequent on traumatization of muscle or other tissue. The only medium of removal of these substances is the circulation, either the lymphatic or the blood vessel system. It follows, therefore, that the removal of these substances under the influence of massage involves an acceleration of those measures which nature, unaided, attempts. The economy as a whole, therefore, may find it difficult under some circumstances to adapt itself to this added quota of the products of faulty physiologic functioning. In certain individuals, chiefly the elderly and the feeble, this difficulty may express itself in terms of a mild toxemia accompanied by fever. What the substances are that produce this result it is impossible now to say with precision, but the consequence to elderly persons may be the addition of a toxemia other than the one from which the patient is already suffering. This is sometimes a practical matter of great importance.

TECHNIC OF MASSAGE

The elementary principles are all that it is necessary for the physician to know about the technic of massage in order to convey to the technician in his prescription the kind of massage he wants and the dosage. In writing for a drug he does exactly the same thing—names the specific drug and the dosage. The physical therapy technician usually knows more of the actual technic than the physician, just as the druggist usually knows more of the actual chemistry of the drug. But the physician should know more of the indications and contraindications for and the effects of massage and of drugs than either the technician or the druggist.

There are three main varieties of manipulations included under the head of massage: stroking, compression and percussion.

1. *Stroking Movements.*—(*a*) Superficial Stroking: This consists of the passage of the hand over an area of the patient's skin with a slow, gentle and rhythmic movement. This form of massage aims to produce only a reflex effect. Therefore the movements must be slow, gentle, rhythmic and in one direction. This is a simple form of massage, but the technic can be mastered only by long practice. The four main points must be observed or the reflex soothing effect is lost and the movement becomes irritating.

The time of the movement is slow in order to be rhythmic and the technician's movement is continuous and in the same tempo even when the hand is not in contact with the patient.

To secure the reflex effect the pressure must be gentle. It should be firm but light, with the hand adapted to the contour of the patient's body, a combination which can be secured only with the muscles of the hand relaxed.

Rhythmic movements are also essential to secure an even stimulus. This is attained by making the time identical between the beginning and the end of each stroke and between strokes. The direction of the movement is unimportant in this form of massage provided it is always the same.

(*b*) Deep Stroking Massage: The aim of this form of massage is to empty the veins and lymphatics and to press their contents in the direction of natural flow.

The essentials here are to have the patient's muscles relaxed to take advantage of gravity, to make the movements deep but not heavy and to make them always in the direction of the venous flow.

It is important to have the patient's muscles relaxed; otherwise muscle contraction will reduce the lumen of the veins and prevent the chief object of this form of massage. To secure relaxation, the patient should always be recumbent even when deep massage is being given to an extremity. Otherwise, when massaging the forearm, one cannot expect to influence the venous flow if the shoulder and arm muscles are contracted.

The recumbent position also enables one to take advantage of gravity as an aid to the venous and lymphatic circulation. For example, when a patient is sitting in a chair with his forearm on a table and his arm hanging from the shoulder, gravity opposes the venous flow. Many a physician in prescribing massage has missed the importance of these finer points in technic.

Deep movement with the muscles relaxed is transmitted to all the structures under the hand. Heavy pressure is not needed, as the venous pressure is slight and a heavy and irregular movement may set up a protective reflex muscular contraction to defeat the purpose of the treatment.

The direction is always with the venous flow. In this form of massage of the limbs, the proximal segment should be treated in the beginning. If the venous and lymphatic circulation of this area is not improved at the outset, the distal segment will be blocked.

2. *Compression Movements.*—(*a*) Kneading: This consists in grasping, wringing, lifting, rolling or pressing a part of a muscle or a muscle group. This form of massage aims to assist venous and lymphatic circulation, to hasten the removal of waste products from muscle, to stretch retracted muscles and tendons, and to aid in stretching adhesions. While it may be used after exercise to remove waste products and thus render muscles more ready to exercise again, neither this nor any other form of massage can develop muscular strength.

Absolute relaxation of the patient's muscles is essential for effective kneading. Too heavy pressure may force the arterial blood against the stream. Moderation in pressure, timing of movement and direction are again necessary.

The operator's hand grasps a part of the muscle (or a group of muscles), lifts it up as much as possible, and kneads it. Then the hand moves up a hand's breadth and repeats the same manipulations. One or both hands may be used. When the muscles cannot be lifted, as on the back, the movements may be one of rolling or pressing one muscle over the other. In kneading, a thorough knowledge of the anatomy of the muscles is essential.

(*b*) Friction: This consists in pressing deeply on the part under treatment and moving the hand in a circular direction, which means usually moving the skin over the underlying parts. The effect of friction is to free adherent skin, to loosen scars and adhesions of deeper parts, such as tendons on the back of the hands, and to aid in the absorption of local effusion.

Friction is an important massage manipulation for the smaller parts, such as the hand, foot and face.

The movement is done with one or two fingers or a part of the hand closely applied to the skin, motion being over the underlying tissue in small circles or in other directions.

Again, the pressure should be moderate and the movement shrould have a certain rhythm. This pressure can later be increased progressively if conditions are favorable.

3. *Percussion Movements.*—(*a*) Clapping consists of bringing the hands, held partly open so that the fingers and palm form a concave arch, alternately into contact with the patient's body. The movement is performed chiefly from the wrists.

(*b*) Hacking is done by striking the patient with the ulnar side of the fingers so that that fifth finger comes in contact with the body first and is followed by the others in quick succession.

(*c*) Slapping is done with the palm of the open hand.

(*d*) Tapping is done with the tips of the fingers, which are used as in piano playing.

(*e*) In beating the half-closed fist is used to percuss the body. These movements are mostly used on healthy persons and are usually employed in gymnasiums and in Turkish bath establishments.

The first effect of percussion on the skin is a blanching due to a contraction of the arterioles from the mechanical stimulation. This is soon followed by a redness which is due to a paralytic dilatation of these vessels from overstimulation. This circulatory effect can be secured better in most cases by other means, such as the whirlpool bath on contrast baths.

Another effect claimed for percussion movements is muscular stimulation. When apparatus is available, this effect can be achieved better in most cases by electrical muscle stimulation.

4. *Vibration and Shaking.*—(*a*) Vibration is performed with several fingers or the whole hand placed firmly on the patient's body while a trembling movement is conveyed by the operator.

(*b*) Shaking is a larger movement of the same kind but is merely coarse vibration. Both vibration and shaking are often employed with one of the three main manipulations.

In movements of deep stroking and kneading made with the muscles correctly relaxed, the effect of vibration and shaking is also achieved. Mechanical means have been devised to give these forms of massage, and the ease of application has led manufacturers selling such apparatus to the public to advance extravagant claims as to the benefits induced.

MECHANICAL MEANS FOR MASSAGE AND EXERCISE

Dr. Gustaf Zander of Stockholm, about 1857, was the first to use mechanical means for massage and exercise. His machines will do anything that any of the highly advertised mechanical vibrators will do. These machines were given a trial in this country, and several large hospitals completely equipped Zander rooms. These forms of apparatus have fallen into disuse, as will the present widely advertised mechanical exercisers, for the following reasons:

1. The point of view that their use develops in the patient is wrong. The advertisements and the instructions for their use convey the impression that the machine will do the work necessary to cure the patient and that the patient does not have to work. Volitional effort is not encouraged, and the machine is regarded as the only factor in the cure. The more expensive the apparatus or installation, the more this thought will be developed.

Our experience in treating war and industrial injuries has shown that mechanical passive exercise will do less than active exercise, with or without apparatus, and that active exercise without a purpose will do less than curative occupational therapy or exercise with a definite purpose. This is based on two well known facts; first, that muscular strength is increased only by active muscular action; and, second, that the best type of exercise is that which requires coordinated movements with a purposeful end, such as are involved in the ordinary trades and occupations.

These machines do not develop volitional effort of any kind—the work being done for and not by the patient. This develops a poor mental attitude in a patient and will react to his detriment.

2. These machines do nothing that cannot be accomplished equally well by simpler apparatus or none at all. For instance, many of these machines are sold to reduce excessive abdominal adipose tissue. In these cases the same results could be accomplished by leg and abdominal exercises without apparatus, with the patient giving himself heavy kneading massage at the same time that he is taking his exercises. In most cases, for general weight reduction much better results could be attained by a walk or a slow run in the fresh air.

3. These machines treat only one part of the body at a time and do not have the advantages of general exercise in developing other parts of the body. Vibratory massage of the abdomen with a strap attached to a motor for ten minutes cannot give as much benefit as does a ten minute fast walk with conscious effort given to pulling in the stomach. The benefit of deep breathing, exercise of many muscles and increase of circulation is actually obtained under the latter conditions.

4. The use of apparatus is stereotyped and monotonous. The physician prescribing one of these machines is making the same mistake that he would by prescribing only one form of massage or exercise. The patient will soon tire of its use. This form of massage vibration and shaking has little place in treatment, and better results could be secured by definite exercises varied enough to prevent monotony or by occupational therapy to prevent loss of interest.

5. The physiologic effect of mechanical exercisers is the same as of that form of massage which gives vibration and shaking. The effect of this form of massage has not the same effect as active exercises and cannot have the same benefits.

6. These mechanical exercisers are actually dangerous. The Council on Physical Therapy has records of severe injuries caused by these machines—a ruptured appendix, hernias, ruptured bladder, ruptured duodenal ulcer, pleurisy with effusion, and torn penis. These cases were reported by physicians as actual results of the use of these appliances.

The Council on Physical Therapy of the American Medical Association therefore condemns the sale of these mechanical exercisers to the public for the following reasons:

1. Volitional effort is not encouraged.
2. The same results could be accomplished without an apparatus.
3. Treating only one part does not give any of the advantages of general exercise.
4. The use of such apparatus is monotonous and the patient loses interest in treatment.
5. The effect is that of massage and lacks the physiologic benefits of exercise.
6. Such apparatus is definitely dangerous.

MASSAGE IN SPRAINS

The best treatment for sprains is frequently given by trainers for various athletic teams. Physicians generally could learn from these trainers many important points in the technic of the treatment of recent injuries. These trainers are paid to keep men in the game and to get them back quickly if they are injured. The ex-

cellent results obtained are due to the trainers' willingness to take time to treat minor injuries and the fact that the patients have the time to devote to the care of an injury that in business is usually not thought serious enough to justify the effort required for proper treatment.

As physicians we often have all these factors present, but we are so accustomed to treat sprains and strains by immobolization and rest that we neglect the use of proper massage, bandaging and mobilization.

Mennell expressed the keynote of the treatment of recent injuries when he said that we cannot heal torn fibers by massage but can assist in restoring the circulation on which depends the repair not only of these fibers but of all the various injuries that have been sustained.

Accompanying a sprain there are often torn ligaments, a tenosynovitis and a traumatic arthritis. There is hemorrhage from the torn vessels. There is muscular spasm and this, with the local swelling, interferes with the venous circulation. But often there is swelling both above and below the joint which the local condition could not cause. This is undoubtedly due to a reflex disturbance of the vasomotor mechanism from injury to the nerves.

Therefore the kind of massage at first used is superficial stroking with the whole limb in a position to relax all the muscles and to take advantage of gravity. This massage aims to restore vasomotor tone to prevent further effusion. This is aided between treatments by proper compression—bandaging or strapping. Later, deep stroking massage and kneading may be used to secure diffusion of the exudate at the site of the injury.

For instance, in the treatment of a severely sprained ankle, the ankle is often tightly strapped and the patient sent home with directions to rest and apply some form of heat. Far better results as to the relief of pain and the restoration of function could be secured if the patient were treated as follows:

The first day the bandage or strapping is removed and, with the patient lying on a couch with pillow under the knee and some support to keep the foot straight, heat is applied in some form, either direct diathermy or radiant heat, for twenty minutes. Then superficial stroking massage is begun over the whole foot and leg, the movement being started at the upper border of the swelling. Deep stroking follows this above and below the ankle, the painful area being gradually approached. The massage is continued for twenty minutes. This is followed by knee and toe motions. The bandage or strapping is reapplied.

If possible, this treatment is given twice on the first and second days, and once on the third day.

The fourth day deep stroking massage, kneading and friction massage are given as on the first day, also relaxed movements of plantar and dorsal flexion of the ankle to the point of pain. The massage should be given over the injured area if there is no pain. Any motion should be limited by the onset of pain. The foot should always be supported when massage or motion is given so as to prevent any further strain of the injured ligaments.

The fifth day the massage is increased over the injured area, and ankle motion is increased. If strapping or a bandage is correctly applied and the pain and swelling are not severe, walking may be started.

The support of the bandage or strapping is gradually decreased, the firmness of massage is increased and walking is gradually allowed.

DISLOCATIONS

In a dislocation there is the same pathologic condition as in a sprain, with more severe tearing of the ligaments and a spasm of the muscles controlling the point. This is usually so severe as to prevent reduction without an anesthetic. After reduction, this spasm is diminished and the condition is the same as a severe sprain with torn ligaments.

The most frequent dislocation is that of the shoulder, and the most usual after-treatment is to keep the arm tightly bandaged to the side for a week or ten days, thus holding the arm in adduction and internal rotation. This treatment should be abandoned by every surgeon. The position of immobilization should be with the arm abducted and externally rotated. The latter position protects the weak group of muscles, the abductors, the deltoid especially, and prevents undue contraction of the strong adductors, the pectoralis majors and the latissimus dorsi. Further, this position favors circulation by gravity. Frequently, after a dislocated shoulder is treated by strapping the arm to the side of the body, more trouble results from a stiff shoulder after the adhesive strapping is removed than from the original injury.

MASSAGE IN FRACTURES

In the treatment of fractures we strive for end-results showing the greatest amount of anatomic and functional restoration. Neither of these should be neglected for the other. Both will be possible with proper reduction by manipulation, traction or operation; proper fixation with splints and traction, plaster casts or operation, and the use of massage and motion with gentleness, patience and skill. It is to be noted that massage and mobilization are not methods of treatment with proper reduction and fixation.

Lucas-Championnière developed massage and mobilization in treating fractures. In his day there were no x-rays and modern bone surgery was not possible, so that fractures were put up in splints for long periods, which often resulted in great deformities and poor functional results. His methods of early mobilization and massage were revolutionary, and, as many patients had poor anatomic results, good functional results were an improvement. Few surgeons now apply his teachings literally, as it is believed that both a good anatomic result and a good functional result are possible. But these are possible only if massage and mobilization are used with the object of securing function without disturbing the anatomic result. Therefore, in fractures with great displacement of the fragments, massage and mobilization will have to start at a much later date than in fractures with little deformity in which the fragments are easily held in position. In the latter, massage and mobilization used early and with light protective splinting are the principal factors in treatment.

The approximate time to start massage and motion in the average case of various fractures is set forth in the accompanying table. Until union is firm, no massage should be given over the fracture except superficial stroking. When massage is being given in fractures, the danger signs calling for less treatment are increased tenderness, swelling or stiffness in the adjacent joint.

The first treatment of a fracture with massage should last only a few minutes, and only gentle surface stroking should be given. Great care must be taken to support the fracture. The part should be prepared for the massage with heating, followed, if possible, by a small amount of joint motion, if this can be done without dis-

*Suggestions for Starting Physical Therapy in Fractures**

Bone	Part of Bone	Immobilization	Position	Duration of Splinting	Convalescent Brace	Physical Therapy: Time to Begin	
						Massage	Active Motion
Clavicle	Outer, mid inner thirds	1. Clavicular cross	Shoulders; back up and out	3 to 5 weeks	None	None	Immediate
		2. Sayre	Same	3 to 5 weeks	None	10 days	2 weeks
Scapula	1. Body	Sayre	Arm to side	4 weeks	Sling 2 weeks	1 week	4 weeks
	2. Neck	Sayre	Arm to side	4 weeks	Sling 2 weeks	1 week	4 weeks
Humerus	Anatomic neck	Abduction splint	Arm abducted	6 weeks	Sling none to 2 weeks	2d day	5 weeks; elbow at once
	Tuberosities	1. Splint	Arm abducted	6 weeks	Sling none to 2 weeks	2d day	5 weeks; elbow at once
		2. Operation					
	Epiphyseal separation	Abduction splint	Arm abducted and external rotation	6 weeks	Sling none to 2 weeks	2d day	2 to 4 weeks; elbow at once
	Surgical neck	Thomas arm or airplane	Arm abducted and slight forward flexion	6 weeks	Sling none to 2 weeks	1st week	4 to 8 weeks; elbow at once
				6 weeks	Sling none to 2 weeks	1st week	4 to 8 weeks; elbow early
		Operation	Abducted	6 weeks	Sling none to 2 weeks	1st week	4 to 8 weeks; elow early
	Shaft	1. Jones humerus splint	Arm to side	4 to 8 weeks	Coaptation splints and sling 2 to 4 weeks	3rd week	6 to 8 weeks; elbow at once
		2. Traction in Thomas arm splint	Abducted	4 to 8 weeks	Coaptation splints and sling 2 to 4 weeks	1 to 3 weeks	
		3. Operation	Abducted	4 to 8 weeks	Coaptation spljnts and sling 2 to 4 weeks	1 to 3 weeks	
	Lower end 1. Supracondylar 2. Diacondylar 3. External condyle 4. Epiphyseal 5. Internal condyle 6. Intercondylar 7. Epitrochlear	Plaster-of-Paris splint	Elbow hyperflexed	2 to 3 weeks	Sling 3 weeks	On removal of plaster splint	3 weeks; avoid passive motion because of danger of excessive callus or myositis ossificans
Ulna	Olecranon	Molded splint	Extension	2 to 4 weeks	Sling 2 weeks; gradually increasing flexion	1 week	2 to 3 weeks
	Coronoid	1. Molded splint	Flexion	2 to 4 weeks	Sling 2 weeks	1 week	2 weeks
		2. Strapping					
	Shaft alone	Molded splints	Midpronation	3 to 4 weeks	Sling 2 weeks	1 to 3 weeks	2 weeks
Radius	Head	1. Anterior angular splint	Elbow at right angle in full supination	2 to 3 weeks	Sling 1 to 2 weeks	3d day	Flexion 1 week; pronation and supination 2 weeks
		2. Operative remove head	No splint	.....	None	3d day	3d day
	Shaft alone	Molded splints	1. Above insertion of pronator teres; supination; elbow at right angle 2. Below pronation with elbow same	4 to 6 weeks	Sling 2 to 3 weeks	1 week	2 to 4 weeks
Both bones	Shafts	1. Anterior and posterior wooden splints; plaster splints	Forearm supinated; elbow flexed to right angle	5 to 7 weeks	Sling 2 to 3 weeks	1 week	4 to 6 weeks
		2. Thomas arm and traction	Same	5 to 7 weeks	Same	1 week	4 to 6 weeks
Radius	Colles'	Molded plaster	Hand abducted, pronated and flexed	2 to 3 weeks	Wrist strap 1 to 5 weeks	2 days	1 week
Carpus	.....	Molded plaster; cock-up	Hand extended at wrist	4 to 6 weeks	Wrist strap 2 to 6 weeks	1 week	4 to 6 weeks
Metacarpus	Shaft	Traction in banjo splint	Extension	3 to 5 weeks	None	2 days	3 weeks
		Ball in palm	Fingers flexed	3 to 5 weeks			
Phalanges	Shaft	Finger splint	Flexion or extension	3 weeks	None	3 days	3 weeks
		Traction in finger calipers	Extension	3 weeks	Palmer splint 1 to 2 weeks	2 days	3 weeks
Pelvis	Any bone	Swathe and suspension in Balkan frame	Supine	4 to 12 weeks	Preferably none	1 week	5 to 8 weeks
		Rest in bed only	.....	4 to 12 weeks	Belt		
Femur	Neck 1. Impacted 2. Displaced	Whitman position; plaster spica to toes and opposite side	Full abduction; extension; internal rotation	12 to 15 weeks	Calipers and crutches 6 to 9 months; weight bearing 6 to 9 months	12 to 15 weeks	12 to 15 weeks
	Intertrochanteric and base of neck	Same	Same	8 weeks	Calipers and crutches 4 to 6 months	8 weeks	8 weeks
	Shaft	Thomas splint with traction	Hip flexion; knee flexion; abduction	Skin or skeletal traction 5 to 9 weeks	Calipers and crutches 3 to 6 months	Immediate	Knee 2 to 4 weeks
	Supracondylar	Same	Hip and knee flexion	Skin or skeletal traction 5 to 9 weeks	Calipers and crutches 3 to 6 months	Immediate	Knee 2 to 4 weeks
	T fracture into knee joint	Same	Hip and knee flexion	5 to 9 weeks	Same as above	Immediate	2 weeks
	Separation of lower epiphysis	Plaster cast; toes to groin	Knee flexion	3 to 4 weeks	Plaster cast gradual extension of knee	3 to 4 weeks	3 to 4 weeks
Patella	.....	Post splint or operation	Extension	Post splint or split cast 1 to 3 weeks	Molder plaster posterior 4 to 10 weeks	Immediate if possible	7 to 10 days when wound is healed
Tibia	Tuberosities	Thomas splint and traction 4-6 weeks Plaster splint or splint cast	Extension	Same as above	Calipers 4 to 12 weeks	Immediate	2 weeks
	Shaft or both bones	1. Thomas and traction 2. Operation 3. Plaster cast 4. Plaster splint	Knee flexion; foot at right angle; avoid rotation	6 to 8 weeks	Caliper or delbet 4 to 8 weeks; plaster splint 4 to 8 weeks	1 week	4 to 6 weeks

*Suggestions for Starting Physical Therapy in Fractures**

Bone	Part of Bone	Immobilization	Position	Duration of Splinting	Convalescent Brace	Physical Therapy: Time to Begin	
						Massage	Active Motion
Fibula	Shaft	Molded plaster toes to knee or just above knee	Knee flexion	3 to 4 weeks	None	2 weeks	2 weeks
	Potts	Plaster toes to knee	Dorsal flexion and inversion of ankle	4 to 6 weeks	Short calipers; felt foot pad and Thomas heel	Immediate	2 weeks
Oscalcis	.....	1. Plaster 2. Operation	Slight plantar flexion and inversion	6 to 10 weeks	Felt foot pad; Thomas heel; inner borders; shoe and heel raised ⅜ to ½ inch	2 to 3 weeks	4 to 6 weeks
Tarsus	.....	1. Plaster cast 2. Operation	Right angle flexion and inversion	4 to 6 weeks	Same as above	3 to 4 weeks	4 to 6 weeks
Metatarsus	Shaft	Davis splint or cast	Inversion and plantar arch preserved	4 to 8 weeks	Same as above	3 to 4 weeks	4 to 6 weeks

*This table was adapted from "Outline of Treatment of Fractures," Archives of Surgery, January, 1923, p. 172.

placement of the fracture. All these are gradually increased, bearing in mind that one is striving to secure union of broken bones as well as return of function. There is no injury in which massage and exercise can be used to greater advantage than in fractures. The general indications as to the time to start there are given only as guides and have to be varied to suit the case, as does the amount and kind of motion and massage. In the early stages the joint movement shoud be done by the surgeon, the patient being referred to the technician later when union is fairly well started.

In fractures treated with a Thomas arm or leg splint, heat and superficial stroking massage should be started early. Some recent research tends to show that callus is formed along the lines of the new blood vessels formed at the site of fractures, and therefore anything aiding circulation in the area of the fractures without producing motion of the fragments should aid in the deposition of callus.

The physician should supervise all early massage of fractures and should give definite directions about the removal of splints, joint motions with or without the splint, and the amount and kind of massage and exercise. Experience has taught us that, when the surgeon seeks earlier healing and better functional results by the use of massage and exercise, he has assumed a greater responsibility in the case and must guard carefully lest overenthusiasm or errors due to carelessness on the part of the technician may spoil the desired end-results.

STIFF JOINTS

Exclusive of cases of bony ankylosis or cases in which there are pathologic contraindications, massage, exercise and continuous traction or stretching by splints have an important place in the treatment of stiff joints. Adhesions inside or outside such a point occur in great variety and in a large number of cases are susceptible to stretching.

In this type of stiff joint, deep stroking massage, followed by deep kneading of the muscles above and below the joint, are used. Some one of the methods of heating the limb should precede these manipulations. Friction massage is indicated immediately over the joint. The fingers should work over all the joint, pressing the infiltrated areas and scars. After massage, resistive exercise and passive movements are used.

It is important to remember that such heavy massage, exercises and passive movements may cause some reaction, but if the pain from this passes off in a few hours, it is not detrimental. If it persists longer and there is an increased swelling, injury to the ligaments, muscles and vessels with effusion, which may organize into more adhesions, has undoubtedly occurred. In such an event massage and exercises should be abandoned, the joint put at rest and heat applied until the reaction has passed. Then the efforts should be resumed with less vigor.

In the treatment of stiff joints the patient often expects too much of massage and heat. Active exercise and proper splinting are equally important, and it must be explained to the patient that these agents are to be used in spite of temporary discomfort. Proper splinting with continuous traction is of great value and must not be neglected.

AMPUTATIONS

The best preparation for massage of an amputation stump is the whirlpool bath. Stroking and kneading of the muscles and forcible stretching of the tissues toward the stump are given to prevent contractures. The scar is treated with fraction and vibratory massage starting at the periphery and working toward the center. The massage is followed by various exercises, directed first toward maintaining function in the adjacent joints and secondly toward rendering the end of the stump serviceable. Fear of anything or anyone touching the end of the stump is almost universal in patients who have had amputation and is best overcome by massage and exercise.

These manipulations should start just as soon as the condition of the wound will permit, usually by the end of the first week. An excellent means of preparing the patient for these various procedures is to have him start, about the third day, to pound a soft pillow lightly with the end of his stump.

It is well for the surgeon to start giving the massage and exercises to these patients before referring them to a technician. Good results often depend on the proper initial handling of these cases. Kindliness, patience and encouragement are of the greatest importance to the patient who has had an amputation.

MASSAGE IN ANTERIOR POLIOMYELITIS

It is to be remembered that massage will not restore muscular power. It has no direct effect on paralytic diseases. It will not help the transmission of nerve impulses from the brain to the paralyzed muscle.

On the other hand, massage has a favorable effect in stimulating the venous and lymphatic circulation of the limb, and direct manipulation of the muscles also carries away some of their waste products. Therefore massage delays muscular atrophy by inducing better nutrition locally.

As soon as the acute stage of anterior poliomyelitis has passed, as distinguished by the disappearance of pain, massage should be started. This should consist at first of only gentle superficial stroking. If the pain reappears, massage should be stopped. In this condition

massage should always be preceded by heat and followed by muscle training. Splinting should be used to prevent deformities by securing physiologic rest of the paralyzed muscles.

The flaccidity of the muscle deprives the blood vessels of the natural protection given them by proper muscle tone, and as the arterioles are extremely delicate it is easy to overdo the massage, produce paralytic dilatation of these arterioles and increase the condition one is striving to overcome. Therefore the massage should be delicate and given for a short period, and the paralyzed muscle should not be pressed between the fingers or against the bone.

Overuse of massage by too long or rough treatments increases muscular atrophy and diminishes muscular tone by injuring the muscular fibers and causing fatigue.

This disease will be considered in a later article.

Peripheral Nerve Injuries

What has been said about anterior poliomyelitis can be repeated for all peripheral nerve injuries. The treatment here is the daily application of heat, proper massage with gentle stroking and kneading of small areas, and passive joint motions. Electrical muscle stimulation is an aid which, when overused, causes the same effects as overuse of massage. Two or three contractions of each muscle daily is ample. Again, it is important to remember that there is no muscular protection for the delicate vessel walls and only the most gentle manipulations are essential. All deep kneading, compression and vibrating movements are contraindicated. Even in the stroking movements, care must be taken not to compress the muscles against the underlying bone.

Massage is only one agent to be used and has no effect unless there is proper splintage to prevent the healthy muscles from contracting and the paralyzed muscles from overstretching. Massage should not be allowed to replace muscle reeducation movements, as muscle strength is increased only by active exercise.

Spastic Paralysis

Massage is given to prevent muscular atrophy and increase muscular tone; and in spastic paralysis, except for mild stroking and kneading, massage is contraindicated, as the muscles are in a state of hypertonicity. The stroking shoud be firm, slow and even. The kneading is performed with the two hands on opposite sides of the limbs and the pressure should be gentle, although here the pressure can be firmer as the muscle tone is increased and there is not as much danger of injuring the muscle or arterioles as in infantile paralysis.

It is usually an advantage in these cases to precede the massage with heat and to follow it with movement. The difficulty in these cases is to secure motion without exciting spasm.

Massage and passive movements are useful adjuncts to prevent the development of muscular contraction and joint stiffness, but the patient must be made to understand that these maneuvers are not going to restore power in his limb. His participation is essential to reestablish normal impulses from the brain to the muscles. His own effort to accomplish active motion is the most essential element in his treatment.

The Use of Massage in Internal Medicine

By Ralph Pemberton, M.D., Philadelphia

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The word massage is hardly more than a synonym for "rubbing" of some sort in the minds of many practitioners. There are relatively few physicians, speaking generally, who have seen massage applied, in a critical sense of the word; there are still fewer who have tried to us it themselves. Before considering the conditions to which massage can be appropriately applied in internal medicine, it is well to consider therefore the limitations that exist in putting into practice this form of therapy. Obviously, intelligent use of any therapeutic measure demands some knowledge of the benefits to be derived and the dangers resulting from improper or untimely conduction of it. Even an understanding of the physiologic basis of massage does not carry with it practical knowledge of clinical application. Knowledge of the duration of a treatment, the frequency of repetition and the vigor of application are relegated at present to the technician giving the massage. It is important, therefore, to emphasize at this point the extent to which practitioners in general are lacking in a perspective of the subject.

To endeavor to extend to the profession as a whole information regarding the use of massage is not alone sufficient, since it is recognized by those versed in this topic that there is a great dearth of persons trained and qualified to carry out this measure. Coincidentally with extension of knowledge among the medical profession there must therefore be an increase, through a definite policy of education, in the number of those persons trained to conduct the various basal forms of physical therapy, massage in particular. Considerable delay will occur before the situation as a whole can be expected to be rectified, but the vicious cycle must be broken somewhere and a beginning made in several directions simultaneously. This reform is in process of taking place, but it is important that existing conditions be appreciated.

Except for the results of trauma, the chief application of massage is in respect to various chronic conditions and chronic disease states. These fall chiefly under the captions of internal medicine and neurology, although as regards the measure under consideration these clinical fields somewhat overlap. The basis for this generalization, as pointed out in the section dealing with the physiologic influence of massage,[1] lies in the fact that the therapeutic effect of massage is achieved slowly by means of repeated exhibition over a considerable period of time. The influence of any one treatment is or should be, at least at the outset, very slight. The cumulative effect of many treatments is, however, unmistakable. Medical conditions that run an acute course in the space of ten days or two weeks offer, therefore, but little opportunity for benefit from it, although there are perhaps some exceptions to this statement.

The clinical condition with which massage has been longest associated, one indeed that has played a significant part in developing and preserving massage as a therapeutic instrument, is the rheumatoid syndrome. Another field of medicine, however, in which massage has probably had equally recognized application is the treatment of neurasthenia by the so-called rest cure, developed and standardized by S. Weir Mitchell. This will be elsewhere discussed. Massage is also of value in many other conditions and under many circumstances encountered in internal medicine, although such use of it is more or less sporadic and out of keeping with many clear physiologic indications for its employment.

In arthritis there is a wide and important field for the application of massage. It may almost be said that few, if any, advanced cases of arthritis of either the atrophic or the hypertrophic type, to follow the nomenclature of the American Committee for the Control of Rheumatism, can be expected to recover without recourse to the principles of physical therapy, massage in particular.

It is to be appreciated that arthritis is largely a systemic disease and not a disease of joints per se,[2] and that in many cases of the rheumatoid syndrome the joint structures may be little or not at all involved. It follows from this that other tissues, especially the muscle and tendinous structures, also demand attention.

Massage has three chief indications in the arthritic syndrome: First, to improve or maintain adequate conditions of circulation and drainage in the neighborhood of involved joints; second, to improve or correct the faulty physiologic processes in the soft structures and especially the muscles; and, third, to compensate somewhat for the lack of muscular activity that inevitably follows protracted local or systemic disability from arthritis or the rheumatoid syndrome. In this last connection it is thus possible to preserve in considerable degree the normal tone and bulk of muscle structure and even to bring about in atrophied muscles an apparent increase in muscle volume or at least in muscle tone as evidenced by the resistance and consistency of the tissues under the palpating hand. It should be a car-

[1] Pemberton, Ralph; Coulter, J. S., and Mock, H. S.: Massage, J. A. M. A. 94: 1989 (June 21) 1930.

[2] American Committee for the Control of Rheumatism, J. A. M. A. 94: 57-58 (Jan. 4) 1930.

dinal principle in the application of massage in arthritis that treatment should never add by trauma to the inflammatory or otherwise diseased process already present. It follows from this that massage should, for the most part, be practiced in the neighborhood of, but not immediately over, the site of arthritic involvement. There are some exceptions to this statement, in that effleurage of the lightest kind may sometimes be practiced with profit over a diseased joint. In general, however, the principle mentioned must be rigidly adhered to and the instances are legion in which a bad situation has been made worse by undue zeal or by frequency of application. It is to be remembered that most persons who practice massage are technicians without a basal knowledge of medicine, though activated by a commendable zeal for their work. Knowing of the benefits often to be derived they are not infrequently led to believe that, if a little is good, more will be better and so are led to carry treatment beyond the proper point. They are often encouraged to do this, indeed, by the patient himself, who feels no untoward effects from light treatment and thinks he will do better with a more vigorous application. It is precisely here that the medical profession in general must be educated to the point of knowing, in all clinical conditions, when to limit the application of massage as well as when to prescribe it.

In connection with arthritis, massage can usually be preceded with profit by the application of heat to the involved part. As explained elsewhere, this opens up vascular channels and softens the tissues, permits a more vigorous application of massage, a larger range of motion of the parts concerned, and generally paves the way for massage itself. When carried out, therefore, with the preceding limitations in mind, a light form of massage in the neighborhood of the involved joint may in itself prove to be a measure of considerable "analgesic" value, as well as contributory to an eventual betterment of the local pathologic disturbance. The reader should be reminded that the processes producing the arthritic manifestations have their basis, in part at least, in marked derangement of the local physiologic equilibrium, especially in the finer circulation. The latter is apparently altered in the direction of vasoconstriction,[2] and the influence of massage, for the reasons elsewhere mentioned,[1] is toward opening up these vascular channels and so restoring the physiologic processes more or less toward normal.

Under nearly all circumstances, massage directed to the neighborhood of joints must be unaccompanied by movement of the joint. "Churning" of the joint is to be studiously avoided. One of the commonest errors made by masseurs in general is that of inducing twisting movements to the finger or other joints, together with passive flexion and extension of nearly all involved joints. A subsiding arthritis may easily be perpetuated or made worse by activities of this sort. Furthermore, the question of passive motion in the form of flexion or extension constitutes a small chapter by itself, and the indications should be clear before it is instituted. From the standpoint of possible trauma to the joint structures, many orthopedists believe that passive motion to joints is accompanied more often by detriment than by benefit. There are some exceptions to this, but in any event great conservatism must be adopted toward it. An advantage in directing massage to the tissues somewhat removed from the joint itself lies, thus, in avoiding undue passive movement of the actual joint structures.

One of the sharp therapeutic advantages in recognizing the two chief types of arthritis is in respect to the fact that arthritis of the atrophic type is prone to lead to fibrous and finally to bony ankylosis, depending on the particular apposition of the bones of the joint and on the duration of inactivity. In this type of arthritis motion should be encouraged within the limit of further trauma, preferably in the form of voluntary motion conducted by the patient himself, and this is best achieved after application of heat and massage to the part concerned.

A frequent accompaniment of the later stages of arthritis, at the chair ridden period and especially in atrophic cases, is edema of the dependent parts. This results partly from the vascular derangement accompanying the disease; partly from the absence of muscle contraction to aid in return of the peripheral blood, and partly from gravity alone. This condition is usually accompanied also by a shiny skin and other evidences of a so-called trophic disturbance. In such instances massage is the only procedure that can rectify the condition and may often appear to work miracles. In these cases and, indeed, in many cases of arthritis, the hands and feet are cold and after a course of massage there may be a marked subjective betterment as well as improvement in the surface temperature and appearance at the periphery.

Because of the systemic nature of the rheumatoid syndrome there also tends to arise an atrophy of muscular tissue referable to a process of "fibrositis" as well as to disuse. Massage, with or without the accompaniment of heat, is one of the few measures that will affect this situation. It should be carried out with great conservatism at first and confined to the limbs. As the patient becomes accustomed to the procedure, the whole body should be included at intervals of every other day. The influence of such systematic treatment is not confined to the muscular system per se but, as is elsewhere discussed,[2] exercises a more subtle influence on metabolism as a whole and on the red cells available to the circulation. There are several varieties of technic in the administration of massage as elsewhere discussed but, so far as arthritis is concerned, those methods which embody stroking and gentle compression rather than pinching and squeezing, are preferable. Great force is not necessary, especially on beginning the treatment, and any one can demonstrate for himself the change in the distribution of blood in the superficial capillary bed from even the lightest form of stroking. A definite contraindication to massage, most of all to vigorous massage, is to be seen in cases, arthritic or otherwise, accompanied by fever or by any debilitating complication. The changes in circulation induced by massage may easily be the means of carrying material from one part of the body to another, and any suspicion of malignancy should constitute a contraindication to its use. In such conditions as phlebitis, massage may induce dislodgment into the circulation of fragments of a blood clot, for example, which might find fatal lodgment in the heart, lungs or elsewhere. It is furthermore to be remembered, as already remarked, that muscles which are the site of myositis or other disturbance of physiology, may be and usually are the seat of accumulation of a certain amount of metabolic "detritus." This is almost wholly analogous to the obvious detritus, in the form of extravasations of blood, that accompanies trauma. The unduly rapid absorption of this detritus,

[2] Pemberton, Ralph: Arthritis and Rheumatoid Conditions, Philadelphia, Lea & Febiger, 1930.

produced by massage, may suffice to induce some toxemia and even fever, especially in the elderly.

THE USE OF MASSAGE IN DISTURBANCES OF THE CIRCULATION

One of the fields in which it might be supposed that massage would have an obvious application is that of disturbances of the circulation. Curiously enough, however, in this field massage is but little employed although at many sanatoriums in this country and Europe baths and some form of massage are given more or less as a routine to most patients. The adjuvant mechanical influence of massage in returning tissue fluids and other material from the periphery to the general circulation might have suggested a wide use for it in cardiac decompensation, with or without actual edema, especially as general massage may induce considerable diuresis in normal persons. Every clinician determines the presence of edema by pressing a finger on the involved part with the aim of determining whether pitting is present. When pitting is thus obtained, it is obviously evident that the fluids within the tissues concerned have been somewhat displaced. The analogy that this effect could sometimes be exerted on a larger scale throughout a whole limb should be simple, but it seems, indeed, to have escaped large recognition in this country. Thus, reference to a widely used American textbook of medicine reveals no mention of the subject in this connection, although English textbooks not infrequently include discussion of it. In almost any cardiac condition with decompensation accompanied by edema, gravity determines localization of the edema to the dependent parts. These parts are usually the feet, the legs, the buttocks and the back. In such cases, therapy is customarily confined for the most part to restriction of the fluid and food intake with or without pharmacologic efforts to increase the *vis a tergo* from the heart. The peripheral tissues of the body are often left to cope, as best they may, with the fluids in them. In health the circulatory dynamics are aided by contraction of the long muscles, a factor which is, of course, absent in conditions of inactivity and enforced rest accompanying heart disease. Under the latter circumstances, properly given massage may be useful.

Massage is no more a specific in such conditions than is rest or the exhibition of digitalis, but, together with these and with a suitable curtailment of the diet and fluid intake, it further influences the mechanics of the situation. It must not be overlooked that under these circumstances massage might conceivably induce undue or too rapid disturbance or resorption of the body fluids or other substances and so induce toxemia. The practitioner should therefore use great caution in the institution of such measures, proceeding to a more vigorous application only when the way has been opened by experience. Massage may also be of value in certain disturbances of circulation at the periphery, such as acroparesthesia, Raynaud's disease and intermittent claudication.

There is nothing in the aforementioned considerations, of course, to justify oversight of the broad principles concerned in the management of disturbances in the dynamics of the circulation. It is a purpose of the present article to point out additionally the extent to which the proper use of massage may sometimes aid and abet the various orthodox measures which should be resorted to.

THE USE OF MASSAGE IN ANEMIA

From what has been said in the preceding section and in that treating with the physiologic influence of massage, the implication is clear that massage should have applications of varying extent in conditions accompanied by anemia. The return of red cells to the circulation achieved by massage should be of limited but definite importance in anemic persons. The increase in the red cell count following massage is demonstrable in any normal individual, but it is noteworthy that this influence is apparently more graphic in anemia than in conditions of health. In carrying out massage on the subjects of anemia, great care must be exercised to avoid overapplication. The profession has not as yet utilized this measure in respect to cardiac dysfunction and the various anemias to an extent large enough to justify dogmatism as to the full possibilities of benefit or as to the limitations to such treatment.

MASSAGE IN CHRONIC DISEASE AT LARGE

There is a wide field for the application of massage in almost any condition, devoid of acute or serious complications, which requires that the subject be kept at rest, especially in bed, for long periods of time. The practice of allowing patients to lie or rest in bed without the institution of measures capable of compensating in part for the normal activities of life is far too common. Under extreme conditions of inactivity, as in severe and widespread arthritis, the human being may literally flatten out, somewhat as does a piece of putty left on the window sill. Gravity and pressure of the bed from below may produce grotesque lateral deformity, so that the bones of the leg, for example, may be palpated as easily from behind as from in front. This is, of course, an extreme and late result but it illustrates the factors operative. Such abuses from neglect can be avoided by the proper use of massage. The evidence of the influence of massage is not limited to the locomotor system but may show itself systematically, equally graphically, in terms of an improved color, sharpened appetite, better sleep, greater contentment with confinement to bed and a general sense of well-being.

The use of massage is important also as a contribution to the maintenance of health in the elderly. As such persons become less able to take exercise and of necessity lead more sedentary lives, they lose many of the benefits incidental to bodily activity. Massage offers a partial substitute for such activity. Elderly persons should never enter on a course of massage except at proper hands and with great conservatism; but many executives in their later years, who carry large responsibilities, have found that massage, in conjunction with suitable periods of rest and mild forms of activity, enables them to maintain themselves at a higher level of efficiency.

Whatever the purposes of systematic massage, whether for a specific disease or for more general ends, it must always be followed, as elsewhere pointed out, by an adequate period of rest, generally about an hour. A point which requires great emphasis is the fact that systematic massage makes demands on the intangible reserves of the body such that depletion may result if the massage is combined with other forms of active therapeusis. The mistake is commonly made of subjecting persons to massage in addition to such measures as sweating, the removal of focal infections, the use of vaccines and the like with the net result that the

sum total of therapeutic activity taxes the individual as a whole beyond his capacity to respond in respect to any of the measures applied. The end-result of such overtreatment is therefore not only failure of benefit but positive detriment in the way of fatigue, nervousness and even exacerbation of the original complaint. The importance of preserving a balance between the various forms of physical therapy applied, on the one hand, and the capacity of the individual to yield the response desired, on the other, must never be forgotten.

A fundamental consideration is that tissues of all kinds require a certain minimum of rest for reparative processes. It is common knowledge that the broken leg requires rest in the form of immobility until the repair, which means union, is achieved. It is commonly overlooked, though equally true in principle, that protoplasm of whatever kind also demands opportunity for repair. In the field of physical therapy this usually means adequate care and rest not only of the parts concerned but also of the body as a whole.

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HEAT

Protection in the After Care of Poliomyelitis. WALTER TRUSLOW, M. D., F. A. C. S., Consulting Orthopedic Surgeon,

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Club-Foot: Congenital Talipes Equino Varus

By W. P. Blount, M. D.

Since Hippocrates described the club-foot and its "cure" few changes have been made in the treatment. He corrected the deformity manually, and maintained the improved position by means of bandages impregnated with beeswax. Since this time the knowledge of club-foot has been many times forgotten and rediscovered. Descriptions have been couched in modern terms and refinements of technic added, but few new therapeutic principles have appeared.

The cause of the deformity has always been an interesting subject for speculation. The early writers inclined to a mechanical theory and cited intrauterine pressure as the main factor. At intervals strong advocates of a developmental cause have made themselves heard. At present the deformity is considered by most writers to be the manifestation of an embryonic maldevelopment, with pressure acting only in a secondary role. Authorities differ also as to the exact structure in the foot which is responsible for the deformity. Poorly developed or spastic muscles, contracted or deficient ligaments, deformed or dislocated bones have been variously blamed. As each man studies the problem and emphasizes a different factor one is reminded of the three blind wise men and the elephant. The impression of a deformity as complex as club-foot naturally varies with the observer. It is true also that the abnormality of the individual structures varies greatly in the different cases. It is perhaps best to conclude that the distortion is maintained by a combination of the position and shape of the bones, the contracture of the ligaments and joint capsules, and the pull of the muscles.

There are three main components of the deformity which must be corrected: the equinus with shortening of the heel cord; the varus, or abnormal inversion of the entire foot; and adduction and cavus of the forefoot, or buckling of the foot on itself. The severity of the individual factors varies, of course, in different cases, and some men have analysed the deformity still further. Internal rotation or torsion of the tibia is sometimes referred to. Careful examination of adult club-foot skeletons and numerous infant club-feet has showed this factor to be non-existant. Review of the work of orthopaedic surgeons of several countries proved that when the foot is fully corrected there is no trace of internal rotation of the leg.

The treatment consists of mechanical overcorrection of the deformity and retention of the corrected position. If seen early, the feet can be easily molded by the surgeon's hands. Older children may require apparatus to aid in forcing the feet into the proper position. At times it is necessary to cut resistant structures. Plaster of paris was first used in 1836 to maintain the corrected position. Since then plaster, splints, and adhesive strapping have been employed as retentive apparatus. But in some cases, after the foot is completely overcorrected and held in this position until the child is walking with wedged shoes, another problem still faces the orthopedist and his ally, the physiotherapist.

In 1806, a trussmaker in London by the name of Sheldrake, recognized that the "action of the muscles is deranged." But it was not until 1894, when Sir Robert Jones emphasized the importance of reestablishing muscle balance, that this factor was appreciated. He said that the club-foot could not be considered cured until it could be voluntarily everted. We know from experience that until a child has learned to pronate the foot actively in walking, the deformity will recur rapidly in spite of braces and tilted shoes. As a result of faulty development exaggerated by inactivity in the position of deformity the muscles of eversion and dorsiflexion are weaker than those of inversion and plantar flexion and at times are entirely inactive. We are confronted with the same problem that exists in certain cases of infantile paralysis. *We must strengthen the weakened muscles by physiotherapy and actual use,* if the cure is to be permanent. In the training of the peroneal and dorsiflexor muscles, exercises will first be assisted by the physiotherapist. Gradually resistance may be introduced. If the weakness is so great that return of power is incomplete, the foot must be stabilized by muscle transplantation, or in older children, bone operations. As in infantile paralysis, the return of power may be slow. Prolonged manipulation and muscle training take patience. The development of a functionally normal foot is a challenge to the physiotherapist as well as the orthopaedic surgeon.

Milwaukee, Wisconsin.

Physiotherapy from the Standpoint of the General Practitioner

By Dr. Henry Pleasants, Jr.

Physiotherapy as a practical measure for the relief of many incapacitating conditions has proven of too much benefit to warrant a statement in its defense. Even those skeptics, who in former years claimed that the benefits accredited to physiotherapy were purely psychological, have swung around to the opinion that in "suitable cases" physiotherapy is indicated.

The general practitioner, however, has given comparatively little thought to the value of physiotherapy in many common disorders which are not serious enough to be referred to a specialist, but which nevertheless are sufficiently incapacitating to be a serious drag on the individual. It is only when these disorders reach the stage of chronicity that they find their way to a physiotherapist through the medium of an intelligent specialist or an enthusiastic patient. Too often in these cases the condition is too far advanced to yield promptly to treatment, and requires a long and tedious regimen which might have been avoided had the general practitioner been less conservative or more wide awake.

The general principles of physiotherapy are designed to increase the nutrition and elimination in parts of the human body which are temporarily put out of commission. A muscle fibre depends for its nutrition upon the flow of lymph around it, and the movement of the muscle from itself accelerates this flow of lymph which also carries off the waste products of metabolism. If, therefore, a muscle remains inactive it soon becomes starved, and lies bathed in a stagnant welter of its own poisonous excretions. As a result of this poisoning it degenerates, loses its vitality, and may never again recover its normal strength. Appropriate physiotherapeutic measures intelligently applied have the effect of stimulating the flow of lymph in stagnant areas and thereby reducing the poisoning as well as increasing nutrition.

The intelligent general practitioner must realize the limitations of physiotherapy as well as its possibilities for good. He may be carried away with enthusiasm over the splendid results in a certain case and find to his chagrin that those same methods applied in another case, seemingly the same, were absolutely harmful. Only the careful study of any case problem can determine the advisability of any course of treatment whether medical, surgical or physiotherapeutic. To advocate deep massage over an inflamed nerve is to court disaster. To rely on diathermy to relieve the tormenting ache of an osteomyelitis is a waste of valuable time. To expect a few treatments by the high frequency current to stop the pain of a cord tumor is utterly ridiculous. But such things are being done every day and the failures are being chalked against the record of physiotherapy instead of against the careless practitioner.

The medical profession is now keenly alive to the importance of the removal of foci of infection as a cure for many of the incapacitating conditions such as rheumatism, neuritis and the like. It has been so frequently observed that the necessity for physiotherapy is obviated by the removal of the offending focus that many intelligent medical men discredit any measures except surgical. This attitude is not unreasonable, but in a great many instances the general condition of the patient is not satisfacory enough to stand the shock of operative measures. Physiotherapy is more than ever indicated here because it may build up the patients resistance to the infection to such a point that operation may be deferred to a time when the maximum benefits from it may be obtained.

More than ever have we come to realize the value of physiotherapy in convalescence. If what we have already said about the stagnation of muscle fibres in periods of inactivity be true, then the stagnation of the entire body over a long period of time must certainly be productive of many changes due to auto intoxication. When this can be obviated by special exercises, massage, passive motion or colonic irrigation the patient will be able to leave his bed in a far healthier condition, and will be the sooner back at work.

It is not the purpose of this brief article to discuss the relative merits of any one branch of physiotherapy from the standpoint of the general practitioner. The thing that is really needed is an intelligent comprehension of the potentialities for good that we have at our disposal. Nauseating concoctions and "shot-gun" prescriptions have fallen long since into the discard. The aim of the medical practitioner today is to discover the cause of the disability and remove it if possible; to conserve the patients own resources for the combatting of disease; and to utilize intelligently every modern method of treatment which may bring the patient back to normal in the shortest possible time.

Some Fundamentals of Nutrition

By Gordon Saxon, M. D.

The state of education of the public in matters of nutrition has been influenced, in recent years, to a large extent by advertising. Those who have things to eat, to sell, attempt, through intensive advertising to effect a salesmanship, so high pressure in character, that their product will find a ready market.

Those having ideas to sell find that the subject of nutrition affords liberal opportunity and such opportunity is frequently embraced as liberally by those who have no message of worth as by those having a true and worthwhile doctrine.

It is unfortunate that such important subjects as foods, and nutrition, though requiring our daily consideration, are nevertheless subjects of almost unlimited confusion. It is not necessary that this should be so, for, among those who know, there is no diversity of opinion. There is an abundant literature illustrating the correctness of this statement.

Mary Swartz Rose, Associate Professor of Department of Nutrition, Teacher's College, Columbia University, has written Feeding the Family, also A Laboratory Handbook for Dietetics. These two books present facts and tell a story which is totally in agreement with the story told, and facts presented by R. H. A. and Violet Plimmer in their very interesting and instructive little book, Foods, Health, Vitamins. E. V. McCollom and Nina Simmonds of Johns Hopkins University have also presented for lay reading their book, The American Home Diet. They have more completely and more technically covered the subjects in a very instructive book, The Newer Knowledge of Nutrition. Walter H. Eddy, Professor of Physiological Chemistry, Teachers College, Columbia University, has given us his little volume, Nutrition.

Professor Graham Lusk of Cornell University Medical School has given a lecture, The Fundamental Basis of Nutrition, which has had an original publication followed by four reprintings. James S. McLester, Professor of Medicine, University of Alabama has recently published an extensive treatise, Nutrition and Diet in Health and Disease. This latter book, though intended primarily for the medical profession, does not conceal its message, but in plain English illuminates, and clarifies the subject on which he writes.

It is unnecessary to cite other valuable contributions of which there are many, since we can carry the point we wish to make if the citations just made are carefully read. They are fundamentally in total agreement and when read it will be found that the agreement is not founded on hunch, nor on financial zeal nor yet on the warped basis of personal choice or religious fervor. They are all in agreement because their inspiration was scientific, fundamental facts.

What are some of these governing facts and how do they influence our diet and state of nutrition? Our machine requires fuel. The fuel requirement is influenced by the amount of work done and by the necessities for heat production. The foods having the highest fuel value are fats and starches, fats as they are found in animal food and in the vegetable world, starches as they are found in cereals and in cereal products and in vegetables. In the relative proportion of ⅔ starch (carbohydrates) and ⅓ fat our fuel foods should be taken in such a quantity that we may maintain an optimal weight under the stress of our work (energy output) and of our heart requirements (influenced by climatic, etc., conditions).

Fully as important as fuel, is maintenance or repair material, for the animal mechanism. The only material available for this purpose is protein (from animal as well as vegetable sources). Neither fats nor carbohydrates can serve as repair material, since they do not contain that necessary fraction, nitrogen. The protein requirement is roughly ⅙ of the daily total caloric intake. This is approximately 1 gram of protein for every kilogram of body weight. Slightly less may suffice. The Esquimau consumes much more, in fact protein predominates in his diet yet rheumatism is unknown to him.

I have not mentioned sugar as a fuel food. It has a high fuel value, but so does alcohol. Sugar has also a high satisfaction value and consequently reduces both the desire for and the requirement of starches. But sugar carries neither minerals nor vitamins, and by its major inclusion in the diet a mineral and vitamin shortage is effected. Not only is this true of sugar but worse than this, it *steps up* the taste, especially in children, to an epicurean status. They no longer like bread, cereals or vegetables unless these be *stepped up* with harmful amounts of sugar.

The animal economy has been endowed with a sugar converting mechanism adequate for all sugar requirements. Sugar should be converted from starches abiding in their native sources and carrying with them an indispensable mineral and vitamin content.

These minerals and vitamins so obtained are necessary for bone and tooth production.

The per capita sugar consumption fifty years ago was eight to nine pounds per annum. Today it is over one hundred pounds. Why an "Eat more sugar" campaign when we can manufacture so readily and so advantageously our own sugar all by ourselves in ourselves.

Vegetable oils are not so rich in their vitamin content as are such animal oils as butter and the oils from fish. They are all equal however in their fuel value.

Proteins are not identical in their construction. Some are more valuable as repair substances than others. These more valuable proteins contain more repair units (amino acids or building stones) than do the less valu-

able ones. In the latter class are gelatin and corn. The proteins of these two proteins have very few of these units and none of the more essential ones such as tryptophane.

At the head of the list, because of their completeness of structure, are the proteins of muscle (such as beef steak or roast beef), the proteins of milk and such milk products as cheese (casein) and those of wheat, oats, rye and barley.

If proteins are not included in the diet their ashes will nevertheless be found in the urine. This means that the body proteins are being consumed and that anemia and other ill consequences will ensue. Proteins therefore should be supplied to balance that loss occasioned by bodily wear and tear. In other words one should maintain nitrogen balance. It is unfortunate that some of the cheaper animal proteins such as beef have been condemned because they are supposed to cause rheumatism and kidney disease. The chemical differences between red beef and white chicken meat exist only in the minds of the uninformed. The chemist does not sanction drawing the color line so far as meats are concerned. Equally if not more unfortunate is the teaching which causes the patient with albumin in the urine to be placed on a low protein diet. The albumin lost in Bright's disease is not the protein of the diet but it is the patient's own serum protein. It is a loss of part of his body. It is very essential that all losses of albumin by way of the kidney be compensated for by a diet sufficiently rich in protein material (red meat if you please) to compensate for all that is lost and hence to prevent the development of anemia.

Sugar and starch restriction is necessary in diabetes for here the sugar lost is essentially the same as that of the diet. It does not represent actual tissue loss and is not at all analagous to the loss of protein in the urine.

If one were to take a two day's protein allotment at one intake with intentions of storing it for future use (as can be done to a considerable extent with fats and also to some extent with starches) he would be defeated in his designs, for, at the end of eight hours the ashes of the entire intake will have appeared in the urine.

From this it will be seen that the total protein requirement of the day had best be divided between the three customary meals. A child going to school or an individual going to his work should have available protein for the first hours of the day. It is not advisable to depend on those eaten the evening before (12 hours) because none is now available, and to avoid frenzied protein *financiering* it is best to have approximately ⅓ of the day's protein allotment in the breakfast. Egg is ideal, also milk though with children and adults it must not be lost sight of that milk is very low in its iron content. So far I have spoken only in terms of governing fundamental principles; now the question comes up "what shall we eat for breakfast, luncheon and dinner." A good breakfast should have orange, or grapefruit or tomato juice made in the kitchen from fresh or canned tomatoes. Other fruits except dried ones are also good for their mineral and vitamin C content. Egg, because of the number of methods and ease of preparation and also because of the rich protein it contains, is ideal. Egg also has a valuable vitamin, fat and iron content. Cereal, if taken, should not be deluged with sugar. Cooked cereals are delicious if properly salted instead of sugared. Milk for children, coffee, if desired, for adults.

An ideal luncheon especially for the school child or the hard working individual is milk or buttermilk (artificially fermented) with sandwich made of cheese with green lettuce or raw spinach or tomato. A home luncheon may consist of a whole grain bread, milk or buttermilk.

A good dinner should consist of a small cup of soup if desired, a serving of meat or fish or poultry will complete the protein ration for the day. Potato, or bread, or rice, or macaroni will supply starch for fuel, and minerals as well. A fresh vegetable steamed, or cooked in so little water that none is to be poured down the sink will furnish minerals and indispensable vitamins. The minerals should not be lost by the employment of excessive amounts of water. Barely adequate quantities of cooking water should be used and should be seasoned and served with the vegetables. Eat the vegetables with a fork if you please, but finish the juice with a spoon. If this be not done the watery residue may be used in soup. The former plan is preferable. Vegetables should never be cooked with "a pinch of soda." This kills vitamin C completely. A salad affords an opportunity to have raw vegetables, nuts or cut fruit. Cheeses add zest to the salad, which if eaten, means that a sweet dessert is not required. If necessary a dessert should be prepared with a minimal quantity of sugar.

A menu of the type mentioned spells "Balanced Ration" and if followed one need not worry about the recent fad having to do with a one week orange diet followed by a plan in which only starches are taken at one meal and proteins at another, etc.

This plan is just one more instance of base coin passing as legal tender.

A mixed meal is ideal, for many sound physiological reasons not possible to include in this short paper, and has the endorsement of those who know.

Balanced mixed rations, sugar restriction, an equable state of mind, an appropriate amount of bodily activity, with a dash of pleasure and sunshine, together with adequate hours of sleep, will produce a sturdy, disease resisting race.

Philadelphia, Pennsylvania.

Mental Health

A Radio Talk Under the Auspices of the Bureau of Health of Philadelphia, Delivered Oct. 6, 1931, By Dr. James W. McConnell, Neurologist to the Philadelphia General Hospital, Associate Neurologist to the Graduate School and the Graduate Hospital of the University of Pennsylvania, Neurologist to the Memorial Hospital, the Oncologic Hospital, the West Philadelphia Hospital for Women

There is not a subject at the present time in which both the medical profession and the laity should be more vitally interested than Mental Health. Definite standards are being developed in various establishments, in industrial plants, in institutions of learning, among government bureaus and agencies of one kind and another, by which the mental health of applicants for employment are graded and catalogued. I do not wish to go into the details of these examinations but I desire to give to you a clear conception of what is meant by mental health, to prove to you how easily it can be injured, yet how readily one can maintain it.

The term "mental" literally interpreted means pertaining to the mind and it is necessary that you accept the expression "mind" in the broadest possible sense and recognize it as the part of the brain which has to do with thought, ideas, emotion, memory, moral sense sometimes called conscience and the appreciation of the difference between right and wrong. "Health," according to the dictionary, is a condition of correct functioning; that is to say all parts of a mechanism are operating in standard fashion. Our subject "mental health," therefore, relates to that agreeable state in which all the functions of the human mind are operating perfectly.

It has been many a long century since Juvenal, the Roman satirist, announced to his followers the importance of a sound body as an aid in the developing of a sound mind, and his slogan "a sound mind in a sound body" is still used as a motto in gymnasiums throughout the world. Mental health, however, must be considered as relating to all periods of life not alone to the years of the gymnasium frequenter. The growing child, the adolescent, the maturing adult, the individual at middle life, and the one who has reached the "ripe old age," all need it. No period of life is complete or happy without it; yet how few of us stop and think of how to acquire it, how to lose it, or how to keep it. The preservation of the perfectly functioning mind is certainly of equal importance with the maintenance of bodily health, and as the trend of present day medicine is toward the prevention of disease rather than its cure, a consideration of the method of attaining mental health is our starting point.

From the earliest days of their lives children are supposed to be trained in correct habits of personal hygiene, in speech, in courtesy, and in respectfulness. Later, accomplishment of these is amplified by school education, where cultural features modify what has already been taught, and aid in the preparation of the growing child for adolescence, when reason more fully enters into the mental life and higher academic and physical education is accepted by those whose mental health is excellent, and operates materially in making them ready for maturity with its added responsibilities. During these formative periods it is impossible for us to dissociate the mental and the physical, if we desire health in its completest sense. Our present systems of education, of society, of economic and political life seem to be constructed about the improper idea that our bodies and minds are separate entities, and resulting from this wrong belief arise conditions of inability to acknowledge or to cultivate comfortable relations with ourselves, and our neighbors. The truth is during adolescence more than at any other period in the life of an individual, it is of importance for mental health and physical soundness to be most intimately associated, and, to reach as nearly as possible a perfect adjustment of the two, all adolescent persons should obtain proper sleep and rest; enjoy a proportionate amount of work and play; experience freedom from anxiety and worry; have control over emotional displays; possess good digestion and correct elimination.

With the advent of the age of maturity, new features of necessity creep into the things which influence the mental health of the individual. Business activities, the responsibilities of marriage, the trials of the rearing of children, all bring stresses by which one's ability to handle important situations are materially modified. During these trying days the popular belief, that heredity and environment exert large influence upon the mental health of individuals, is a serious threat. There is probably much truth in this belief, especially to those individuals who feel they are suffering from bad heredity and faulty environment and are inclined to the supine acceptance of the conditions imposed upon them by their ancestors and by their surroundings. A large factor in the development of mental health is the correct understanding of these hereditary and environmental influences to the end that they may be combatted successfully. We all strive to overcome physical stigmata from similar sources in the pursuit of the perfect body, the school-girl complexions, charm of person, and beauty of face. It is logical to suggest the acquirement of mental health by conquering ignorance; eliminating evil thinking habits; by ridding one's self of worries and anxieties; by excluding jealousy; by learning to play, to rest, to sleep; by indulging in pleasant and, if possible, profitable employment; and by forgetting entirely the queer and poorly understood interferences with mental and physical health handed down to us by careless and thoughtless progenitors. The

individual at middle life who finds physical and mental fitness continuing in intimate association is the rare bird who has constantly, patiently, thoughtfully striven for the perfect functioning of both forms of health. By the completion of this era of his existence so smoothly is his machinery working that nothing short of a calamity should alter the rhythmic harmony of his life. He has followed the rules of the game, has played it well and is far on the way to victory.

The survival of the fittest is "the one who has reached the ripe old age," who finds happiness in a mental health the result of years of effort in acquiring it and now rests upon the laurels of maintaining it. Such a person will relate struggles along the lines we have just rehearsed, will speak of the combining of physical condition and mental integrity, and will tell, with the famous Sir William Osler, that the philosophy of the whole thing is equanimity—evenness of mind—a state of perfect balance of pleasure and pain, of happiness and grief, of play and work.

If one considers, as one should, that mental health is the correct adjustment and the perfect functioning of all the elements of the human mind, the ease with which it may be impaired or lost becomes apparent. Take the child, for instance. Wounds of the mind undoubtedly occur from harmful thoughts or bad experience and they interfere with mental operations just as do injuries of the physical health from accident. It is not an unusual procedure for the psychologist of today to trace disturbances of mental health to their origin and their lodgement in the brain. Frequently these trauma, as the psychologist calls them, have their initiation in childhood or early youth and not rarely are the direct outcome of terrible tales told by nurses and others to the growing child. The ultimate result of such things is often a disturbance of mental health by the production of fear—a most difficult thing to be conquered once it is established. In the present day and generation an evil habit with those who have reached early maturity is that they give too little time for deliberation and contemplation, for opportunity to live with their meditations; and too much to filling their lives with purposeless movement and hurry. In company with the young and sometimes with the old, they run the gamut of emotional instability. Thrills, with them, seem to be essential to socalled happiness with resulting restlessness, a desire always to be doing something and usually something different. The outcome of the failure to attain these ends causes the reaction of extreme mental unrest, even profound mental depression. Hours of sleep are curtailed, periods of rest are shortened; work becomes a burden instead of a pleasure and play of the proper kind is forgotten in the pursuit of this pseudo-happiness. Youth is replaced by premature age. Mental health is gone.

With the advent of full maturity or of middle life the fluctuations of financial conditions produce a desire, not always consummated, to make one's self independent; the effort to adjust themselves to new and unusual methods of living intensifies the mental reactions of husband and wife; the education and the acute physical illnesses of growing children cause anxiety and the worry of expense to parents. The urge to "keep up with the Jones'" becomes almost an obsession. Mental health is lost sight of in following the present day trend toward exaggeration. Individualism, as should be exemplified by the family, is forgotten and the herd instinct becomes supreme so that physical soundness is threatened by the efforts of the struggling mature adults to continue with the procession. Soon comes a break in the physical health, the mental health follows and the courteous lover becomes a grouch, the amiable sweetheart is replaced by a nagging female; fault-finding and accusation replace the peaceful living of the once happy couple and the divorce court looms in the offing, with the picture of lonely and unhappy old age in the near distance. Certainly the pictures drawn do not pertain to everyone nor even to a majority of us but they are fair illustrations of experiences in my own practice. The conditions can be avoided and should. How? Let me suggest modifications of our serious contemplations of life some of which certainly can be utilized in restoring or maintaining mental health. In the words of that distinguished psychiatrist, John K. Hall "Mental health comes from right living and sound mental health makes right living possible."

Centuries ago there lived in Israel a king who has always been regarded as the wisest man who ever lived. People came to him from all the corners of the earth for advice and he has handed down to us much of his wisdom in the form of proverbs. He expounded the belief that "a merry heart doeth good even as a medicine." We moderns are inclined, rather incorrectly, to interpret the observance of this proverb as the utilization of our sense of humor or perhaps of having a good time raising "whoopee." My idea is that Solomon meant more than that. His merry heart related to a mind free from worry, from anger, from sorrow, one that was not disturbed by lack of moderation in all things. He was a firm advocate of the sound body and the sound mind. He preached rest, recreation. His later history shows he fell a victim to the transgressions of the principles and precepts laid down by him.

P. G. Wodehouse, in a recent story somewhat paraphrases the dictum of the wise man by saying "happiness is the only cure for dyspepsia. Be gay, be cheerful, and if you can't be happy you can smile." In other words, I take it, he believes in the dependence of mental health upon bodily perfection. That mental health intimately depends upon physical fitness is an axiom of the art of medicine; also, moderation in all things is a practical necessity to both. The elimination of various evils, to some of which attention has been called is an essential. If each and everyone could have a standard of living easily attained, comfortably carried through and continued, regardless of our next door neighbor or the other fellow; if there were less outpouring of emotion in the various activities of life so that one could conserve mental energy for the more trying things of our existence; if one could recognize that an attitude of mind towards success is better than the worry and depression which is so destructive of peace of mind; if sleep and rest could be substituted for late hours; and the almost never ceasing restlessness of our present life be supplanted by periods of meditation; results along the line of development of clear thinking and sensible reasoning would be achieved and the mental health with which the start in life was made and which was amplified as the years passed would be maintained until need for it has vanished.

Electrocoagulation of Hemorrhoids

By Benjamin F. Tefft, M. D.

Professor Doumer of France was the first to use electrocoagulation in the treatment of hemorrhoids, almost 30 years ago. Since then, the method has been employed by a rapidly increasing number of physicians, because of many advantages over the surgical technic.

The operation does not equire hospitalization, can be done in a physician's office and the patient can at once go home.

Under proper local anesthesia, the operation is painless. The after effects vary, depending on amount of tissue or number of hemorrhoids removed, but is less distressing than the surgical technic, that is by being generally anesthetized and cutting with knife, suturing and confining to bed from two to three weeks. The end results are harder scars than those of Electrocoagulation, which are soft and more pliable. I have known some patients to go to work in a few days after operation, but usually direct to rest in bed a few days, eat as usual, daily defacation, and go to work in two to three weeks.

There is no bleeding during the operation. This is of particular advantage where, as it frequently occurs the patient has already developed a secondary anemia, due to frequent loss of blood from his hemorrhoids.

Infection does not occur at the time of operation, as it is a sterilizing procedure; the heat generated is sufficient to destroy micro-organisms as well as body cells.

The occurrence of embolism is precluded by the fact that there are no clots or loose tissue left in the blood vessels to be taken up by the blood stream and swept to other parts of body. The lymphatics and blood vessels are sealed by the treatment; think of this advantage, no temperature, one less possible complication.

The depth to which the tissue is destroyed is dependent upon several variable factors which cannot be accurately gauged. The factors include the amount of current used, the ossilations of the high frequency machine, length of time it is permitted to act, and the electrical resistance of the tissues.

The electro-surgical clamp method is the preferable one in every instance where it is possible to apply it, because the destroyed area is more definitely delimited; I use Bierman's Hemorrhoid Clamp and am very pleased with results.

The coagulation occurs only in the area lying between the jaws of the clamp. This obviates the danger of destroying too much or too little tissue. The uncertainty as to the depth of the destructive effect of the current is removed. The area is destroyed exactly as desired, permitting the immediate removal of the hemorrhoid.

The action of the electro-surgical hemorrhoid clamp is in no way comparable to that of the ordinary surgical clamp used in the clamp and cautery method. The ordinary surgical clamp compresses the tissue at the base of the hemorrhoid, insuring hemostasis when the tissue beyond it is removed. The electric clamp has only very slight compressing action, being so constructed that its jaws are separated where they are applied against the hemorrhoid. The very purpose of this separation is to prevent the hemorrhoidal tissues being compressed tightly, thus insuring a broad base which can be coagulated by the action of the electrical current. In the usual clamp and cautery operation, an artificial tuck of skin, of mucous membrane, or of both, is made, and the tissue removed along a very thin linear area. This area is then seared over with actual cautery. What happens therefore is a superficial carbonization of tissues over a thin line. With this technic, the occurrence of secondary hemorrhages may be explained by the tendency of the adjacent remaining tissue, which has thus been artificially tucked, to pull apart, the glueing action of the thin and superficial carbonized area being insufficient to hold it together. With the use of the electro-surgical hemorrhoid clamp, the destructive action actually occurs within the tissues embraced by the clamp. The resistance of the tissue to the passage of the electric current of high frequency, which is traversing it between the two active electrodes on either side, causes the development of heat sufficient to coagulate it. The destroyed area thus has sufficient width and depth to hold the healthy ends of tissue firmly together and thoroughly to cover the healthy tissue underneath, and has a gray line showing area coagulated.

After the base of the hemorrhoid has been coagulated, the area above it is removed by means of scissors, scalpel, or the electric cutting current. This is better than permitting the tissue to remain "in situ" until it sloughs off ten days to two weeks afterwards; the dead mass acting like a foreign body, causing mechanical irritation and producing an offensive odor as it decays.

The preparation on the part of the patient consists in the thorough evacuation of the bowels, aided, if necessary, by an enema. If the operation is to be performed in the morning, it is suggested that the patient partake only of some crackers and milk. If in the afternoon, the patient is asked to take only tea and toast for lunch. One hour before operation I give 6 grains sodium amytal, which produces hypnotism, the patient will then do just as told and have all confidence in the operator.

The operation may be performed with the patient in

the lithotomy position. It is not necessary to use an insulated table. After the region about the anus is washed with soap and water and painted with some antiseptic, the local anesthetic I use is Procaine 2 per cent, 10 to 15 c. c. is injected perianally. The perianal method of anesthesia is preferable for two reasons: It allows dilatation of the sphincter, permitting ready access to internal hemorrhoids; and it does not distort the shape and size of the hemorrhoidal mass as does the local injection into the hemorrhoid itself.

This form of treatment can at once be extended to include any polyp present if a fissure or a small area of prolapse. Then you can rest assured that when a part is destroyed it never reoccurs.

The after treatment of patients operated on for hemorrhoids by means of the high frequency current consists preferably of rest in bed for a few days, depending on the amount of discomfort, and the application of some soothing ointment such as butesin picrate. If there is much discomfort, it is advisable to use hot compresses of magnesium sulphate solution and if necessary suppositories containing opiates, Amido Pyrine 5 to 6 grains is effective.

I have been using this method which is modified Bierman's technic since 1927, and it continues to be my operation of choice.

West Warwick, R. I.

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A New School of Physical Education and Physiotherapy in Washington, D. C.

Contributed

The Washington School of Physical Education at 1726 New Hampshire Avenue in Washington, D. C., was established this fall. The school is in a large handsome building, formerly a residence on beautiful New Hampshire Avenue, and is near the homes of many well known people.

The Perry Belmont house, which the Prince of Wales occupied during his visit to Washington, is near by; the house built and occupied by the late Thomas Nelson Page, is only half a block away; the former residences of Mr. Charles MacVey, recently ambassador to Japan, and of Mrs. U. S. Grant are also close by; and many of the houses are used as foreign legations, as one can tell by the display of flags in front of the houses.

The avenue, one of the widest in the city, is lined with magnificent trees, so tall and wide spread that the upper limbs touch and form a canopy of green the whole length of the avenue. Dupont Circle, with its beautiful trees and the fountain erected to General Dupont, is a very short distance away.

The interior of the school building is handsomely finished, with hardwood floors, and carved woodwork on stairs and walls; and is large enough to provide class and dancing rooms, study hall and gymnasium on the first floor, while on the second and third floors are many bedrooms which supply ample and attractive sleeping rooms for the students.

The school offers two, three, and four year courses. The two year course, for which a certificate is granted, is a teacher's training course; The three year course is equivalent to a Normal School course, and for this a diploma is given; and the four year course is equivalent to University and College work.

At present only the freshmen and sophomore years are represented, but students have already registered for the junior year, and the school fully expects to grant a degree upon the completion of the four year course.

Students do practice teaching on the playgrounds and in private schools in Washington. The courses are based on standard requirements, and every effort is being made to establish a school maintaining a high standard of work and requirements.

Two special courses are offered, Playground and Physiotherapy. In the Playground course the students are trained to become teachers, supervisors and organizers of playgrounds, and are given instruction in Scouting, Education, Camping, Sociology and all the necessary practical work which will enable them to be efficient in each branch.

The Physiotherapy course is open to graduates of recognized schools of Physical Education and Nursing, and to students taking the Physical Education course.

The curriculum is planned to meet the requirements of the National Physiotherapy Association. The theory courses are given at the school and at Children's Hospital, practical work in Corrective gymnastics at the school, and other practice in the clinics at Children's Hospital.

This winter a series of lectures on medical and surgical subjects is being given by the Medical Association of the District, each address being given by specialist, and these the Physiotherapy students are required to attend, and they have found them most interesting and instructive. The first lecture, given by Dr. J. P. Leake of the National Institution of Health, was on Poliomyelitis, the second on Mental Health was by Dr. Stanley White of St. Elizabeth's Hospital, and the list which has been published for future lectures during the winter shows that they will be given by men and women of equal prominence. As Washington is headquarters for many of the National Health Organizations in which most interesting research is being done by men of national prominence, the people of Washington are most fortunate to be able to hear these speakers.

The teaching staff is composed of Miss Pearl Hicks, Director of the school and instructor in Anatomy, Biology, Organization and Administration, and Folk Dancing. Miss Hicks was formerly head of the Department of Physical Education at States Teachers College where she organized and introduced the four year department in Physical Education. She is a graduate of the Thomas Normal School where she majored in Physical Education. She also attended the Physical Education Department at the University of Wisconsin; and she received her Master's degree in 1929 from George Washington University. She has had several years' experience in organization and coaching.

Miss Louisa C. Lippitt has charge of the Physiotherapy instruction, giving these lectures in Massage, Therapeutic Gymnastics, and other required subjects not given by the staff of the School of Physical Education, nor by the Orthopedic surgeons at Children's Hospital. She also supervises all Practice work.

Miss Lippitt is a Registered nurse, and a charter member of the National Physiotherapy Association. She was for several years Director of Corrective Gymnastics for Girls at the University of Wisconsin, was sent to France as the head of the first unit of Physiotherapy Aides to go over. She has been Director of Physiotherapy at Children's Hospital for several years, and lectures there and in other Training Schools for Nurses in Washington. She is the author of two text books, one on Personal Hygiene, the other a Manual of Corrective Gymnastics.

Miss Elizabeth Morrison, a graduate of Fredericks-

burg States Teachers College, is Director of Athletics and Instructor in such courses as Physiology of Exercises and Hygiene. She was a student at the University of Wisconsin for more than a year, working towards her master degree, which she hopes to complete in the near future. She is an experienced teacher.

Miss Bernice Wood in charge of dancing is also a graduate of Fredericksburg State College and has majored in Interpretative dancing under Miss H'doubler at the University of Wisconsin. She was at one time head of the Department of Physical Education at Lacrosse College in Mich.

Miss Emma E. Newton, English Instructor is a graduate of Lenoir-Rhyne college in N. C. Miss Newton expects to obtain a master's degree at George Washington this winter.

Miss Bettie Wirt, an accomplished musician and instructor in music in the Public Schools, is Director of Music.

Following Through

By Mildred Elson

The Junior League Curative Workshop has recently started a posture clinic for children. This addition to our physical and occupational therapy service came about through the demand for both corrective and preventive work in this field. Our present group is composed mainly of the typical undernourished fatigue type. Among these are a number of T. B. suspect cases, whose physician felt an "ounce of prevention was worth a pound of cure."

Having limited space and no gymnasium, we use our physical therapy equipment, removing the mattresses from the treatment tables to give a hard surface. No special equipment is necessary for this clinic.

Each child receives a careful back and general examination. Photographs are taken in the profile, showing the natural standing position and self-correction.

Our approach to the child, the careful preliminary training, and the development of a kinesthetic sense of the postural muscles is most necessary. Our future success rests on that approach.

The general routine is as follows: First, the classic abdominal retraction, with pelvic tilt, rib stretching, and diaphragm breathing advocated by Dr. Goldthwaite. Second, a sandbag roll is placed under the shoulders from three to five minutes. The hands and arms are overhead or behind the neck. This is excellent for stretching the pectorals, correcting forward head, and producing hyperextension of the back. Several sandbag rolls graded in size should be on hand to suit individual needs.

To this routine we add individual exercises as needed or as indicated by the physician. We feel that back extension is important and that we must have strengthening and developmental training. The Klapp creeping exercises are utilized for those with a structural scoliosis for this purpose in addition to the stretching which they give. The child must completely master the underlying principles of each exercise before new ones are introduced or else he will become confused.

The true test of the value of this training is the ability to maintain good posture in general activity. If this is impossible, we have failed.

With this need of carrying over of the principles of body mechanics we give our children group play which we call Recreational Therapy. This includes marching, skipping, story plays with emphasis on reaching and stretching. For example, playing carpenter, one climbs a ladder, reaches for nails, boards, etc.; or, playing firearm, similar activities may be introduced. Imitating animals, as bears, elephants, giraffes, is excellent for stretching, strengthening and developing large muscle groups. Folk dances, such as Seven Jumps, require alertness, agility; the rhythm is fast and the whole respiratory system is quickened, aiding in chest expansion. These are varied from week to week, so that the child will not become bored. There is an exhilaration to this sort of exercise that cannot be given in any other way. The groups are taken for no more than a ten minute period so that the time taken is negligible for the fun and exercise that is obtained.

The time has been too short for us to offer any statistics as to how much better or how much quicker good posture is maintained. Our attendance is good, our children happy, and, according to doctor's reports upon re-examination, our results satisfactory. We shall, therefore, continue in our experiment of "Following Through."

Milwaukee, Wisconsin.

Introducing Motion in the Abduction Splint for Poliomyelitis of the Arm

By Dorothea Sorenson

Probably no group of paralyzed muscles gives more concern to the physiotherapist in her work than the shoulder group, particularly the deltoids. This is due in part to the frequency of involvement of the deltoids (Lovett ranks them first in the upper extremity),* and also to the fact that failure of return of these muscles so frequently makes necessary an arthrodesis of the shoulder.

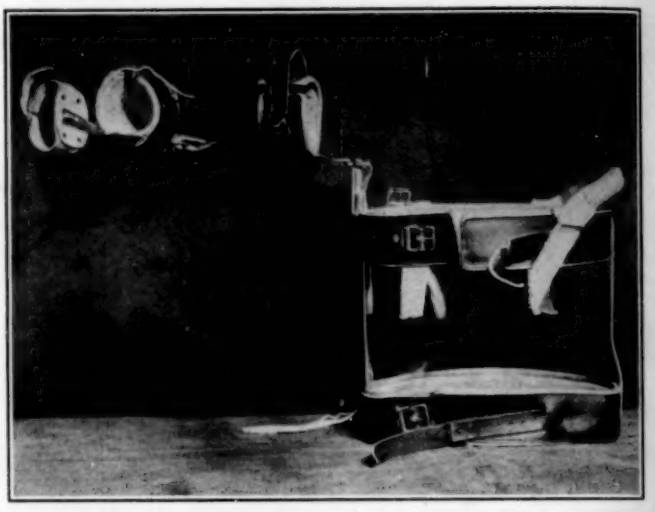
The use of the "aeroplane" splint, either of plaster or in the form of a brace, to prevent contraction and to provide proper rest is no new idea. Details of construction of such supports must be worked out for each individual case according to the extent and severity of involvement. A few fundamental features are, I believe, common to all:

1. Absolute support for the whole arm must be provided.
2. The desired position for each segment of the arm must be determined and provided.
3. The desired amount of immobilization for each segment must also be determined and provided.

For some time we have employed the various forms of splints here at the Children's Orthopedic Hospital, varying according to the stage and severity of the case. For all cases which will require treatment over a long period of time I prefer the brace with two lateral uprights joined by two horizontal bands with the metal extending across the back and a little way in front of the chest. I find the two lateral uprights will eliminate the constant hunching of the shoulder and lateral bending of the trunk which is, according to my observation almost certain in the brace with but one upright.

For quite a while we have used free elbow motion for cases in which the forearm is not involved and in cases where the muscles about the elbow are sufficiently strong to warrant free action with gravity eliminated.

Within the past two months we have applied the same principle to the shoulder, adding a joint there in place of the usual absolute immobilization. Obviously



we have not had time to fully determine its merits or demerits. However, I am passing the idea on for whatever value it may contribute.

The joint itself is a simple pivot and can be made with a stop to limit motion in either direction. Some cases, for instance, where the anterior deltoid is quite weak and there is tendency to forward dislocation of the head of the humerus, it seems best to limit the motion backward by stopping it a few degrees in front of the side-horizontal position. This tendency is also decreased by the use of the shoulder strap.

The possibility of getting too much action of the weak muscles, thereby producing fatigue, is being studied. Extreme care in selecting cases will be necessary and it is possible that the shoulder joint motion will be unsatisfactory for very young children because of this problem. Time and trial only will show its value. But I believe with careful selection of cases it will be of some value, particularly for the period where more action is desired but the muscles are still too weak to begin discarding the brace.

Children's Orthopedic Hospital, Seattle, Washington.

*Lovett: Treatment of Infantile Paralysis; 2nd edition 1907

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All changes of address must be sent to the Secretary, Treasurer, Director Bureau of Appointments and General Manager of the REVIEW. This will assure delivery of important notices and of the magazine. No second class mail is forwarded.

EDITORIALS

The Executive Committee Writes Again!

For an organization as scattered as is the American Physiotherapy Association, it is important that its members make every effort to create harmony and efficiency in the administration of its affairs.

Although it is necessary to leave details to an appointed few, the membership as a whole should feel free to keep in touch with the committees in charge. All helpful suggestions and bits of information are welcome and for such communications the addresses of the officers will be found at the top of this editorial page.

The most natural, and certain the most practical way of spreading information is through THE PHYSIOTHERAPY REVIEW. Therefore, READ YOUR PHYSIOTHERAPY REVIEW!

All changes of address or membership should be sent immediately to the national treasurer.

The Wisconsin Chapter has extended to the Association a cordial invitation to hold the 1932 Convention in Milwaukee, June 27-30.

Already preparations are underway for our entertainment, and one of the important ways in which the individual members can help, is to collect material for our professional exhibit; such as, books, diagrams, charts, photographs of all kinds, apparatus and anything of interest to a P. T.

Further notices of the Convention will appear in the two next issues of the PHYSIOTHERAPY REVIEW. You already know what business items are under discussion. Be ready to discuss old business and to introduce some new.

Sincerely,

EDITH MONRO, Chairman, Executive Committee.
November 1, 1931.

November 27, 1931.

The Wisconsin Chapter wishes to extend an invitation to every member of the Association to come to Milwaukee next June to our annual convention.

We are trying very hard to arrange an interesting program, but it won't be any fun unless you all come. We cannot promise the original of the beverage that made Milwaukee famous, but will do our best.

The slogan of the state is "On Wisconsin"—so let it be that for each and every one of you.

M. E.

In the last issue I was pleased to see an article making a plea that more attention be given to massage.

Massage was the main feature in physiotherapy; the other modalities were built around it, but now they have obscured it. In medical literature we read, "Under certain conditions the doctor should give the massage himself."

Just why should a doctor be endowed with a native ability to give message? It takes long and continued practice to give massage; to know when and how to give deep and then light massage and always with rhythm. Even then if nature has not given you a strong firm hand, you can never give good massage. It is the branch in which personality and humanities are strong factors.

"Patients want understanding and sympathy, coupled with ability and knowledge."

L. A. W.

An error was made in the report of the Legislative Committee, published in the convention number of the PHYSIOTHERAPY REVIEW.

We are happy to note that we do have A. P. A. members in Louisiana. Marion Bentley Stewart of the Charity Hospital, a charter member and Camille Hyland, both of New Orleans, La.

Thanks Louisiana for letting me know. Let's hope we will soon hear that there are enough members to have a chapter.

MATHEA BOXETH,
National Chairman of the Legislative Committee.

Legislative Committee

MEDICAL PRACTICE ACT ENFORCEMENT

Published in the November, 1931, issue of the Texas State Journal

State Board of Medical Examiners' activities in the Rio Grande Valley, in connection with the enforcement of the Medical Practice Act, have resulted in much agitation on the part of the unlicensed practitioners of medicine in that section. The first report of this campaign was noted in the Weslaco Vigilante of April 30, which stated that the first case of quackery filed against a Cameron county chiropractor would be held in county court, at Brownsville, May 1, when W. S. Hamel, a Brownsville chiropractor, would answer to the charge of illegal practice of medicine. This first case was speedily tried and the defendant was assessed a $250 fine and a thirty-day jail sentence by a jury in the Cameron county court at law, May 1. This speedy conviction greatly disturbed those who did not have licenses granted by the State to treat the sick, and there promptly appeared in Valley newspapers advertisements pleading the cause of chiropractic, endeavoring to show that chiropractic education was on a par with the education demanded of medical graduates. The spurious claims set forth in this comparison are well known to our readers.

The next incident of note is that W. S. Hamel, the chiropractor first convicted of practicing without a license, was denied a new trial, May 30, according to the Brownsville Herald. Notice of appeal was given and it was stated that Hamel's case was being closely followed, as there were about 25 similar cases on the book against Valley chiropractors.

After a lull of a few months, no doubt used to full advantage by the defendants and their cohorts in paying for advertising propaganda, the Edinburg Review of Sept. 14, notes that "A number of Hidalgo county chiropractors are scheduled to go on trial in county court Sept. 16, on charges of practicing medicine without a Texas license. As a preliminary to the trial the chiropractors plan to hold a meeting at the city hall in Weslaco, at 8:00 P. M., Sept. 17, at which Dr. Jim Drain of San Antonio, president of the Texas Chiropractic Association, is to speak. The purpose of this meeting is to get the case of the chiropractors before the public . . . The general public is invited to this meeting." The advertising propaganda must have been effective, as we note in the Edinburg Review of Sept. 18, "A request by the State for an instructed verdict of not guilty brought to a close Sept. 18 the first case against a Hidalgo county chiropractor to come to trial." The defendant in this case was Dr. Simon Bellar of Weslasco. The motion for the acquittal of the defendant was made by the State when the star witness for the State failed to present a check which he stated that he had given the defendant in payment for treatment. The star witness declared that "he could not find the check, that he was not sure he had given the chiropractor a check, and the latter had never asked payment for his services." This success, if it can be called a success, was promptly followed by another victory on the part of those charged with illegally practicing medicine. We note in the San Antonio Express of Sept. 23 that "Three charges of practicing medicine without a state license against Dr. Luzia M. Truog, McAllen, chiropractor were dismissed Sept. 21 in Judge E. C. Couch's county court until the November term of court." Thus closes the chapter until the November term of court.

It is quite evident that what apparently started out to be a successful effort on the part of the State Board of Medical Examiners to enforce the Medical Practice Act in this section of the State, now possesses a dubious future, certainly in regard to these cases. What is the cause, and, more important, what is the remedy?

The answer to the first question is the supreme effort put forth by the defendants to curry public favor by means of ridiculous claims relative to the value of the so-called science of chiropractic. This campaign cost money, but it was evidently money well spent. The average layman reading a chiropractic advertisement setting forth a comparison of the educational requirements of chiropractic and medical schools has no criteria upon which to base an opinion as to the veracity of the statements made. If they go unchallenged, he has no reason to believe they are not true. And, yet, who shall challenge them.

The only authoritative body existing in the United States, that has made a careful investigation of institutions holding themselves out as qualified to train students for the vocation of treating the sick, is the Council on Medical Education and Hospitals of the American Medical Association. A comprehensive survey of chiropractic schools in the U. S. was made by this organization in the summer and fall of 1927 and the report in full, which also included a survey of schools of naturopathy, was published in the May 1928 number of The Journal of the American Medical Association. The comment on this study, we feel is sufficiently interesting to reproduce here. It follows:

"To any one familiar with the elaborate equipment and curriculum found necessary to proper training in the science and art of healing today, the most impressive thing about these naturopathic and chiropractic schools is not what they are, but what they are not.

1. Of the fifty active schools listed, a few are mere 'branches' rather than separately existing institutions, and these fifty constitute less than ⅓ of the number formerly existing.

2. All but a mere handful of these 50 existing schools are so poorly housed and so inadequately financed that their continuation is problematic.

3. Very few of these schools have even one adequately trained teacher on the faculty, and there are probably less than 5 expert all-time teachers in the entire lot of 50 institutions.

4. Not one of these schools actually enforces a matriculation requirement of even 5 minutes of high school study.

5. Not one of the 50 schools gives so much as one worthy laboratory course or has one worthily equipped laboratory.

6. Not one of these schools conducts a clinic in which a wide variety of the common diseases may be studied.

7. There is not one clinic equipped with the trained personnel or the scientific apparatus for the clinical diagnosis of a variety of the common diseases, or having a laboratory equipped for checking such clinical diagnoses.

8. There is not one clinic equipped for the proper treatment of patients suffering from such diseases.

9. There is not one of these schools whose students or whose faculty may enjoy the privilege of practice or even of observation in any worthy hospital.

10. There is not one of these schools that does not proceed on the basis of improved theory, ignoring the lack of endorsement by all worthy educational institutions.

11. There is not one of these schools that does not ignore or even avowedly oppose the scientific point of view and the facts of medical science accepted by the authorities of the entire civilized world.

12. There is not one of these schools that does not owe its existence to the fact that it offers a short-cut to the practice of medicine."

While it is readily appreciated that supporters of this alleged healing art will immediately point out that the survey comes from a medical organization that is biased, which they vehemently refer to as a gigantic medical trust, their contentions will not serve to set aside the facts in the case. They can not point to a single university of standing, including all of the state universities, where chiropractic is recognized—universities which, on the other hand teach the principles of all varieties of scientific subjects, such as astronomy and engineering, or the professions of law, dentistry, medicines, and so forth. This is an indictment that even a charitable public can not fail to appreciate. In the 25 or more years of the existence of chiropractic, all its adherents can point to in favor of their practice is an accumulation of testimonials, and it is a well known fact that testimonials can be easily secured for any medicinal agent, including mud; it has been so from the beginning of time.

It is to be hoped that when the annual registration of physicians practicing in Texas becomes effective, the State Board of Medical Examiners will add to its law enforcement activity the equally important function of educating the public to the need of enforcement of the Medical Practice Act in the protection of the public health, which feature is provided for in the law. This function might well be shared by the bureau of public health education of the State Department of Health.

"ENFORCING THE MEDICAL PRACTICE ACT is a big job, in spite of the fact that its law is simple, straight-forward and perfectly clear, and in spite of the further fact that, according to the law, any person who assumes to treat the sick, by whatsoever method, and receives remuneration therefore, of whatsoever sort, directly or indirectly, is in fact practicing medicine. For years the State Medical Association has cooperated closely with the State Board of Medical Examiners in an effort to see that this very necessary and certainly very fair law is used for the purpose for which it was intended, namely, the protection of the unsuspecting and credulous public from imposition by inadequately prepared practitioners. The State Board of Medical Examiners has been, for the most part, without funds, and the State Medical Association has had to furnish them money. We have been glad to do this. It is simply one channel through which we have passed our money in the protection of the public health.

There are many licensed practitioners of medicine who do not belong to our Association but who are equally responsible to the public as our members are, and these have contributed practically nothing to the efforts of the State Board of Medical Examiners to help enforce the law. There are numerous quacks and pretenders, some of them so thoroughly entrenched that it is very difficult to secure their convictions in the courts available for prosecution. In one section of the State complaint was filed against a number of alleged violators of the Medical Practice Act and several were convicted. Some of the cases were postponed. During the period of postponement the defendants took occasion to purchase much advertising space in local papers, in which they made specious and false claims as to the training the practitioners of their particular cult had received, and of the value of their bizarre theories as to the cause and cure of disease. These advertisements reached practically every prospective juror in the county. When the cases were called in court there was no conviction. The cases have been refiled, according to our information, but if the same procedure is followed the same results are apt to obtain. The only recourse would be well devised counter-propaganda, and who wants to fight the devil with fire, even though we are told that procedure is sometimes necessary?

Our object in referring to this matter at this time and in this manner, is to urge the medical profession on Texas, individually and collectively, through medical societies and direct, to get in behind the State Board of Medical Examiners and help to prepare the way for a much more vigorous and successful enforcement of the Medical Practice Act and the annual registration law.

The annual registration law becomes effective Jan. 1. At that time, each practicing physician in Texas will be expected to register with the State Board of Medical Examiners, giving much needed data to that governmental agency and paying $2.00 for the privilege of registering and continuing practice throughout the calendar year. The State Board will compile a list of the legalized practitioners of medicine in this state as it stands each year, and will use the registration fee in paying the expenses incident to the administration of the law and bringing into account those who are practicing medicine and who steadfastly refuse to obey the law. If the State Board is to be successful in its endeavors, it must know who is practicing medicine in Texas, both legally and without sanction of the law. Last month we editorially asked our readers to help the State Board in locating all such. County societies have been asked to furnish the State Board with complete lists of the practitioners in their respective jurisdictions. Quite a bit of information has been secured, but far from enough. We are repeating the appeal.

Let us reiterate. What is wanted is the name and address of each individual assuming to practice medicine in this state, by whatsoever method and under whatsoever guise. This includes the reputable practitioners of medicine, of whatsoever school, and the various quacks and cults of whatsoever stripe.

It is only fair that those who have the right to practice medicine in Texas help pay for the enforcement of the law, if any are required to do so, and it is of importance that those who do not have the right to practice be identified as outlaws, whether or not they may successfully be prosecuted. The fact that they claim to not be violating the law is beside the point if they are in fact violating the law, and the terms of the law will determine that. Incidentally, the members of the State Medical Association who are required to pay the fee will be out nothing in view of the fact that the annual dues of the State Medical Association have been reduced in the amount of the fee."

WALTER REED GENERAL HOSPITAL

Army Medical Center
Washington, November 10, 1931.

It has been erroneously reported that the training course in Physiotherapy conducted at Walter Reed Hospital has been discontinued. The elimination of the Army School of Nursing this year does not affect the Physiotherapy course in anyway. On the contrary, plans are already under way for the training course beginning October 1, 1932 for which both professional and physical requirements are higher than those of previous years.
EMMA E. VOGEL, Supervisor Physiotherapy Department.

BOSTON CHILDREN'S HOSPITAL CONTEST FOR MATERIAL TO IMPROVE THE TEACHING OF BODY MECHANICS

OBJECT—Better Body Mechanics in School Children. Are you trying to combine interest and progression with the necessary fundamentals in your teaching so

that willing cooperation and habit will maintain good posture in your classes? Prizes will be given for papers describing practical methods of obtaining better Body Mechanics in school children. Certain fields may be chosen, for instance: Certain grades in schools. Schools for Crippled Children. Clinics.

JUDGES—Dr. Robert B. Osgood, Professor of Orthopedic Surgery, Harvard. Dr. A. H. Brewster, Children's Hospital Clinic for Lateral Curvature of Spine and Faulty Posture. Miss Leah Thomas, Ass't Professor Physical Education, Smith College. Miss Janet B. Merrill, Dep't Physiotherapy, Children's Hospital.

Entries will be accepted from Physical Therapy workers and physical education teachers individually and from the heads of school departments or clinics as group entries.

For rules of the contest, apply to the Physiotherapy Department, Children's Hospital, Boston. Winners will be announced at the time of the 1932 American Physiotherapy Association Convention.

May 5, 1931.

Miss Janet B. Merrill, Director,
Department of Physiotherapy,
Children's Hospital, Boston.
Dear Miss Merrill:

The Report of the Sub-Committee on Body Mechanics of the White House Conference suggests that over 75 per cent of the school children of the United States exhibit poor or bad body mechanics. The report also suggests that there is a close association between good body mechanics and good functional health and poor body mechanics and poor functional health. The causes of this surprisingly large incidence of poor body mechanics need to be investigated, but whatever the causes are, poor body mechanics is not inevitable and may be improved by an amount of training which does not conflict with the regular school curricula of studies or physical education, as was shown by the Chelsea Survey. Reliable data are at hand also which seem to prove that given proper incentives, improved body mechanics once attained as a result of training is maintained without continued training by the vast majority of children.

If the findings of the White House Conference are correct, all physical therapists are faced with a challenge to better existing conditions. There is at present far too casual training in the principles of body mechanics in most of the schools of physical education. Correct body mechanics should underlie all physical therapy. There is much work to be done and we need the help of all physical therapists. The goal is no less than a more efficient race.

Very sincerely yours,
ROBERT B. OSGOOD, M. D.

RULES

Papers submitted must stress the fundamentals of correct Body Mechanics throughout—in addition they should emphasize methods of holding the children's interest or should show definite progression extending over two or three grades of school age.

Material dealing with the pre-school or kindergarten age will not be considered.

Papers may be of any desired length, and must contain a comprehensive program extending over at least one year's work. They should be typewritten on one side and can not be returned. Material submitted will not be published without the consent of the author, but may be used for the benefit of other instructors.

In order to be considered for the competition, entries must be received not later than May 1, 1932.

First prize, $50, from the Children's Hospital Research Fund. Second prize, $25. Honorable mention.

Winners will be announced at the 1932 convention of the American Physiotherapy Association.

Survey of Prevailing Theories and Methods of Treating the Spastic Patient with Physiotherapeutic Applications*

By Ruth Aust

PART IV—PHYSIOTHERAPY

CHAPTER VII—AIMS AND THEORIES OF APPROACH

The Physiotherapist, as well as any of the other clinicians, draws a basis from the fund of information accumulated from all these sources. It is her duty to watch that the various prescriptions are carried out. She makes a very good intermediary between the patient and the doctor. She is in the position to feel the pulse of the home life. Irregular habits and environmental factors come under her observation.

Before we can continue with the physiotherapeutic technic, it seems necessary to have some fundamental principles which will allow for individual technic and variation with different patients. There are too many problems involved, which have not yet been finally solved, to state the following principles or any such principles dogmatically. They are only suggestive to provide for continuity in methods of treatment. Then, too, this is an educational procedure and we must have something to work for.

The common aims to be sought are:

1. *Localization of control.*

This involves teaching the patient to develop specific motor patterns and how to restrict the execution of those motor patterns to the proper muscles.

The physiotherapist's job is to place the following into neural harnesses controlled by the brain: hundreds of stimuli, over-acting postural reflexes, misdirected messages to antagonistic muscles, and general static tension, resembling the generalized intense effort, as in a tense person magnified many times.

2. *Synchronizing the localizations.*

This is a step ahead of Number 1. From the wooden soldier type of control, he must be taught a rhythmic interrelationship of muscle control and joint movement. His muscles of fixation and purchase, which accommodate the movement (see paragraph of reflex movements) must be controlled.

3. *Balance Adjustment.*

Perhaps Number 2 could be included in Number 3. He must acquire the fine adjustment of the postural reflexes as expressed in equilibration exercises. Besides just synchronizing movements, he must maintain his balance.

4. *Extero- and proprioceptive response control in relation to environment.*

We aim to educate his ability to orientate himself to his surroundings. This briefly involves visual and auditory impressions; kinetic, static, arthrodial, and tactile sensations; and the memory of same. By this is meant the ability to control movements, as pointing. Reaching involves many of these elements. Movements requiring judgment anticipate control in relation to outside factors. Estimations of speed, distance, relative positions are included.

5. *Avoidance of positions of deformities.*

This also implies avoiding deforming positions and overcoming of those existant as much as possible. If the flexors are tense, positions to allow them to increase their contracture should be avoided. If joints are maintained in a deforming position, effort should be directed to correct it.

Besides meaning only this, we must include the most *fundamental knowledge.* All movements are directed to contract the stretched muscles and relax the tense. As a safe rule, this means *all movements* should be *"OUT, OVER, UP,* and *BACK":* abduction, external rotation, extension, and supination.

6. *Social—economic aspect.*

We aim to make the patient a useful citizen. As an aim, this will modify the treatment in view of the end results. We want not perfection but independence, physically and mentally. We want him to be as free physically, and as independent socially as possible and as soon as possible. We wish to qualify him to live in his environment and to equip him so he can do what he needs and will be required to do. As a parallel, Physical Education does not aim to make the average person a perfect specimen in physique but rather one who will function well in his particular niche in life. This is in keeping with all our educational standards in branches of education: to render the individual as good a citizen as is inherent in him.

With such a patient, we must assume a supervisory attitude to his home environment. Everything that everyone does in the child's environment is a part of his education.

* * *

These aims are merely tools, the use of which depends upon the individual physiotherapist.

The following is a suggestive procedure for the physiotherapist in the light of those aims and the preceding discussion concerning infantile cerebral palsy.

The environment should be directed first. The child acts as a physical mirror to its environment. Ideally, the family attitude, wholesome and encouraging, sensory stimulations, e.g., radio, color, voices kept soothing. Eliminate nervous tension. The child's habits and all

*The first half of this paper appeared in the September-October issue.

habits of the family that affect him should be regulated like clock work. Visiting teachers, who are trained with such cases, should be procured. Most of this will probably be supervised by the doctor, but the physiotherapist must appreciate the possibilities and be cognizant of variations as they affect the case.

During the youngest years, before much volitional control, most orthopaedists who have expressed their opinions seem to emphasize avoiding deformities and contractures. This is done by manipulations, pillows, splints, sandbags, or braces. The contracted muscles should be cautiously and continuously stretched. During the manipulation, try to keep within the limits of the stretch reaction (whenever a muscle or part of a muscle is stretched, reflex tonus of the same muscle sets up tension to counteract the effect of stretching).

The neuro-muscular re-education begins at approximately two years, according to the mental age of the patient. The possibilities of the neuro-muscular education are, in a measure, in direct relation to the I. Q.

"During the first 3–4 years of the child's life is almost entirely a matter of assisting the child to do what it can for itself. . . . . The treatment of patients in the third stage . . . . is entirely to restore muscle control, for it is only through the ability to control muscle action that function becomes possible."[1]

The prognosis will depend on what we are restoring. Remembering the complete process of a voluntary contraction, the physiotherapist should know what she is trying to restore. Any place along the line may be damaged. The problem is: is the central control working (the cerebrum)? Is the despatcher's co-ordinating department O. K. (the cerebellum)? Are the wires crossed or down (the pyramidal tracts)? Does the muscle respond to the message when it does arrive (Peripheral stations)?

If the sensory switchboard is damaged, the volition probably never expresses itself in a muscular mode. Other mental training (directed by the psychologist) should take place to bring his mental level as developed as possible. Our end results are in proportion to the extent of that damage and the facilities and adjustments the rest of the brain develops to help take on the added burden.

If the volition is there, the neural path being blocked —crossed reflexes, etc.—the training then demands a performance continued until a reflex is built—if that is possible—considering the extent of damage and the I. Q. In the constant repetition, with will, and directed movement may awaken the stimulation of the neural path and achieve controlled movement.

With the pyramidal tracts working and only will, excluding tonic control, we get a contraction similar to tetanus because of the tension which the muscles maintain. In this case, the first principle is to develop reflex action (which we hope to acquire). We repeat and repeat the same movement until nature provides a short cut or reflex arc.

There seems to be three general approaches or attitudes of the physiotherapists in their attempt to teach localization. Probably none of them adhere strictly to any one.

First, using rhythmic or monotonous repetition of movement to get relaxation. The voice goes upward and the desired movement follows: abduction perhaps. Accompanied by the voice, music, metronome or rhythm, or rhyme, a movement is executed either independently or with assistance until the lengthening and shortening reflex stimulation and increased muscle tonus is at minimum.

Second, working for introspection to get relaxation and localization. Putting the body into position of least tension regardless of contractures, consciously relaxes the synergistic muscles of those contracted. Sometimes the patient gets the idea of localizing in a certain region, if the technician will indicate by placing her hand against that area, e.g., abductors. The method aims to build up muscle balance by toning down the over-active muscle.

Third, maintaining objective attitude to get relaxation. By appealing to the age interest, corresponding to basic mental age of the patient, we are motivating the patient to make the desired movement. Situations are created so he can do something and at the same time avoid contracture.

These suggestions may need a qualifying statement. The nervous stimulation must be cut down to the minimum in everything. Reaching to touch something can be made an exciting, hilarious game, or a controlled, satisfied movement, according to the voice, manner, and technique of the physiotherapist. Reaching may mean flexion, and adduction, but according to our fundamental aims, they must mean abduction, extension, and external rotation.

CHAPTER VIII—MODALITIES AND GENERAL PRINCIPLES

Certain principles perhaps contained commonly in all techniques are universally acknowledged.

Biological sequence:

In our biological development the dramatic period comes early. To teach gestures, to indicate wants, is consistent both with our educational and physical aims. Parents can place objects in such positions that the arms are abducted, elbows extended, and forearm supinated in order to satisfy possession. One grounded in Physical Education knows that gross movements precede finer controlled movements: shoulder, hip, joints, trunk, etc., and that the elementary gestures carry this out.

Gestures precede speech, but are very closely allied to speech developmnt. At this stage, the speech training is almost inherent with the physical education. From the speech director, the physiotherapist learns what sounds the child is learning and directs movements suitable. For instance, if child says "O," the arms circling overhead impresses the image, combines voice and movements, and motivates repetition. Movements demanding co-ordinations too difficult will definitely slow up speech progress. At this period, it is most important that parents should be instructed to speak slowly, enunciate distinctly, and demonstrate careful physical control, to furnish the child the correct pattern for him to imitate.

What is true of these very young children is true of the older. If one can harness up the natural development of the instincts as they develop expression in the various stages of growth, into controlled and desired movements, we are following a natural educational procedure.

Establishing sensory contact:

"The physiotherapist ascertains through which sensory channels she can get the most intelligent response, e.g., the child's comprehension might be bad, the visual attention poor, motor co-ordination very bad, but the auditory sense and rhythm sense quite good, so this is her point of embarkation."[2]

The intelligence of a spastic quadriplegia, who drools

[1] Dickson, F. D., M.D., *"Treatment of Cerebral Spastic Paralysis—Special Reference to the Stoffel Operation."* Journal American Medical Association. Oct. 18, 1924.

[2] Lowman, C. L., M.D., *"Spastic Paralysis in Children."* Medical Life. Vol. 29, No. 11. February, 1922.

and has faulty vision, may be normal. It is a real problem to discover the approach to unlock it.

We try to improve his education to the point of obtaining purposive, volitionally localized movements in order to get the most satisfactory result (synchronization and integration of volitional, postural, visual-motor, and vestibular mechanisms).

Evolution of motor habits:

We will return to nature's way of dealing with motor habits. During the first few years of a child's life, we have demonstrated the automatic movements and co-ordinations as found governed by the cerebellum. The approved theories explain these as reflexes inherited during our process of evolution. As the child grows his experiences accumulate. Motor patterns begin to develop. We give him rattles, bright balls, cribs to kick against, with the result that a contraction, taking place over and over again, finally gets a definite result. Visual impressions link up with memories of a series past reaching, short reaching, and much tension and dissatisfaction. Always the wish to do the action comes first. Finally impressions mount up until the cortex can give the order to all contracting, stretching, and synergistic muscles to work together with a fine distinction.

"It is the nature of a voluntary muscle to perform any motion with greater ease the more frequently it is repeated, and to act most readily with those muscles, or in company with those sensations with which it has been used to combine its action, either at once or in succession."[3]

Hence reflex actions are formed.

Now the spastic may have the same stage prolonged indefinitely because of the wider spread of synergistic involvement and the greater sensitivity to stimulation. He has a harder time to reproduce the same movement in the same way.

We will go back and repeat the learning process of the average pyramidal tract stage of governing co-ordination. Give him an objective that is tangible. The joy of achievement is displayed early. The movement, of course, demands our desired extensors, supinators, etc. The spastic must learn to do through conscious effort what we do unconsciously. This should be so facilitated that his volition gets a quick and easy response in case he must always be doomed to voluntary control. The Montessori system of education will be helpful.

Another principle we can use to great advantage is this: If the purposive end for accomplishing a directed movement corresponds to the age interest, mental development and muscular co-ordinating ability, the movement becomes pleasurable. Play should find expression through repeating the same movements. After training the child, leave him in the same situation with his equipment and toys, and he should express himself by an effort to do the same movements. This principle is a suggested vehicle for carrying out the aims.

In advanced co-ordinations, movements may be done with more localized control to music. The use of music and metronomes seems especially desirable in accomplishing aims two and three.

In some spastics, a certain set of reflexes may dominate the whole field of control. For instance, the neck reflex states may be predominate. If the neck or labyrinthine reflexes are overactive on one side, the whole trunk and body position will adjust itself. If standing is possible, the complete balance is distressed. Then, if the head were to be held actively or passively in the neutral position, speech becomes easier, grimacing will lessen and a general relaxation of the trunk will follow. The same is true with other reflexes. Wherever the spastic spasm of certain muscles fixes the extremity or trunk in a certain position, the general posture must accommodate it; e.g., contracted thigh flexors must cause flexed knees, lordotic backs, etc.

Psycho-motor relaxation:

The patient must learn to relax, being helped by listening to a story, singing to himself, watching the swaying of a metronome, listening to music (Dr. S. Stewart suggests strumming as expressed by promitive peoples), consciously sensing support of tables and resting heavily, breathing deeply and relaxing. Control the situation by limiting excitement, sensory impressions, and stimulation as much as possible. We try to get the patient, if possible, into a state of lazy revery or a condition anologous to it. The keynote throughout the whole physiotherapeutic technique *"sensory sedation"* (C. L. Lowman, M.D.).

One of the best methods of obtaining this condition so desirable for treating the spastic, is in a therapeutic pool, room silent, with a temperature of water from 96–100 degrees Fahrenheit. A state of sensory quiet and relaxation is produced from the heat of the water, the sensory contact with the water, and interest in the procedure.

The attitudes outside of the water are not transferred. The elements of gravity, friction, and much of the balance strains are avoided. Apprehensions, associated situations or positions often are eliminated. Out of water the patient constantly compares his performance with other people. In the water his own progress is his only standard.

Again, the joy of achievement is inherent in direct relation to accomplishment and consciousness of it. The water offers infinite possibilities of gaging achievement. Supination followed by slow relaxation may cause a celluloid boat to float away, etc. Movements are performed repeatedly with pleasure. If both legs are abducted strongly and slowly relaxed together, swimming is achieved. If the patient can't float, a bubble boat (description similar to surf boards, the body is suspended by two canvas bands from parallel bars. The bars are connected overhead and at foot by rods and the whole is supported in the water by inflated rubber balls at each corner) will furnish a means of support. The same is true with almost any co-ordination and movement.

A very important consideration is the possibility of trunk movements which are so difficult otherwise. Water is a much better medium for range of movement, as various side lying, rolling, and twisting movements are possible. With trunk movements, elimination is improved. Physiologically, the patient is definitely better off. Following a pool treatment, without fail they report a state of greater relaxation and better sleeping. Trunk control, which is big muscle activity, is of such importance to the spastic that it rates very high in the scale of the advantages of a pool. The trunk is the static connection between the joints in the extremities (movements spread from one to many joints) and synergists to every gross movement are trunk muscles. Body balance out of water is centered in the trunk. Much integrated organic function is regulated thereby, also. Patients can be instructed what home work to do in the tub.

Walking in a pool is a more relaxing activity than outside of water. The water is the bouyant medium. In the water the act is disassociated from past experiences.

[3]Fearing, Franklin, *"Reflex Action."* Pp. 100. Williams & Wilkins Co., Biltmore, U.S.A. 1930.

To eliminate distracting sensations, the ears may be plugged or dark glasses worn. It will raise the threshold for concentrated work.

The general procedure of treatment in the pool, when possible to obtain it, is outlined:

The patient is placed (the Orthopaedic Hospital Hydrogymnasium) on a table with a portable stretcher top on which he can fix himself with his arms. He then can be lowered into the water by the use of an electric hoist, the physiotherapist sliding him off, giving support, floating him into position on a partially submerged inclined plinth. Thus handled and supported, he develops but little fear and the momentary intensification of his rigidity is soon overcome.

The general procedure of treatment in the pool, if such is possible to obtain it, is:

1. Lying, leg and arm movements in abduction, external rotation and extension; trunk movements laterally, and extension. Progression indicates various lying positions: supported on plinth, apparatus, e.g., bubble boat, and free floating.

2. Side lying with trunk and leg movements. This is especially good for extension. Progress from plinth to hand fixation on the side of pool.

3. Prone lying on plinth, at level of water so that face is not submerged, same movements are possible as with supine position. Breath control with face submerged is a trunk exercise very desirable.

4. From prone lying, prone floating begins. The log roll can be done at this development.

A more complete description of the movements possible and the technique used in pool treatments may be found in "The Technic of Water Gymnastics in Muscular Re-education" by C. L. Lowman, M.D., Orthopaedic Surgeon, and Susan G. Roen, Director of Physical Education of the Orthopaedic Hospital-School, Los Angeles, in Am. Phys. Edu. Review, October, 1928.

CHAPTER IX—SUGGESTIVE TREATMENT

To suggest a course of treatments for a spastic, since all spastics are individual problems, seems ridiculous. Yet considering the extent of damage, environment, intelligence quotient, age, etc., the range probably is not wider than the average school class. All that is possible, is to suggest something tangible for the beginning technician who must use her own tools.

Almost everyone does active stretching to contracted muscles. The law of stretching reflex makes an intelligent guide.

Lying is usually the most relaxing position. If possible and suitable, gross movements of extension, abduction, and external rotation of arms or legs should be done. This can be done by indication—direction with slight pressure or toy to be resisted. Increase difficulty by aiming to touch object or working against friction of the table. Motivate by dramatizing or drawing upon imagination, e.g., child inhales and blows wind wheel on exhalation, blows to feel pressure on hand, exhales with a certain word or sound.

Leg abduct against resistance.

Leg abduct to touch object.

Leg abduct pushing object (increase weight or friction).

Both legs abduct passively. Progress same way.

Both legs abduct to test strength (quite advanced because of trunk synergists).

Always wait for thorough relaxation between each movement.

Prone lying, especially good for neck, trunk, and leg extension. Usually the flexor groups are too active to allow much leg or arm abducting in this position. Lying seems the most satisfactory for leg abduction. Side lying is a progression from friction to gravity resistance.

Half prone lying is still avoiding balance, but better means for leg and trunk extension. Imagination may have a wide scope, e. g. child can play spy while doing trunk extension.

Sitting can be used for arm movements, knee extension, and trunk movements. Here equilibrium is involved and flow of movement has a greater spread. Postural reflexes are in play.

Trunk exercises with sand-bags on head, books, etc., are games if played as such. At the same time, the neck reflexes are controlled. According to Susan G. Roen, however, weight on head should be given to older children; in young ones there is a tendency to lessen control.

Arm movements can be gross: abduction, extension, yet indicate wants: toys, food, placed judiciously to demand the desired movement.

If the motor pattern is not established, assistive movements are necessary. However, a joy of completion stimulates effort—reaching up and touching an object or spot. Keeping track of range adds interest. Games are desirable only as long as the keynote "sensory sedation" is the guide.

Suggestive arm movements:

(In developing the training of monoplegic spastic arm which has hypertonic muscles and is carried but not fixed in adduction, flexion, elbow flexed, forearm pronated, wrist flexed, and fingers flexed.)

Postural reflexes are only slightly affected, due to synergistic muscle action for shoulder movements, so sitting, standing, and lying positions would all be included.

1. (a) Motivated arm abduction in all these positions. Lying if stretching is necessary, advise to stay within stretch reflex. Child could sing while he attempts to abduct arm. Technician would adduct. Arms could be used at first, graduating to use of one.

(b) Abduct arm and relax slowly, without assistance.

(c) Abduct arm, extend, relax.

Directing:

Combining the ocular motor.

Combining the ocular sensory motor, against resistance, e. g. toy, pushing train on track. Movement involves extension of elbow and shoulder. Toy pushed by forearm.

2. Grasp. Extend fingers over object suitable to finger contracture. This is visual - tactile motor control. This progresses into flex, grasp, relax. Changing object, varying range of finger movements, and increased strength of finger extensors.

3. Combining 1 and 2. Grasping and directing.

4. 2 plus supination, which will probably be assistive. Or passively supinate, then use extension of fingers, e. g. place ball into hand, roll into hand, drop, toss, etc.

5. Grasp, supinate.

6. Grasp, supinate and extend elbow.

7. Grasp, supinate and extend elbow and extend fingers.

And so the game proceeds: Grasp and release into vessel. Here is the added difficulty of those elements involved, as in pointing.

Grasp and release in a pile, blocks, etc.

Grasp, supinate, and release. Try to roll ball out of hand, see side of object in hand which will call for supination.

Grasp, supinate, extend elbow and release.

Grasp, supinate, extend elbow and toss, push.
Grasp and throw.
Grasp and throw with increasing accuracy.

These are only a suggestive analysis of treatment of one typical extremity. I've tried to show how to go from the simple to the complex, using the more simple movements first, and slowly adding motor and mental difficulties, and still keep to the age interests.

These should be carried out in play. If the child sits or stands with his playthings in the same place as he receives his instructions, he will direct his activity unconsciously in the same channel.

The same procedure can be worked out for dorsiflexion of foot and knee extension, even if the tangible only means resistance to be overcome.

Depending on the case, balancing can be encouraged more easily if the toys to be played with are at a level, demanding a standing position. The body may be supported under the axilla or by a table to lean against.

If crutches will expedite the walking, instruction may be given in a walker, progressing in difficulty until the crutches can supplant the bars. Standing, leg abduction, is easier if the leg range is measured either in distance or time. To stand and abduct a leg until it touches a toy dog, is more interesting than simple abduction. Also, to walk forward by stepping from one piece of paper to the next will provoke better cooperation than walking. Walking may be varied infinitely by obstacles, lines at various spacings, difficulties for balance as sand bags, soldier caps, books, and similar combinations.

The more intimate his training is related to his needs, the faster the development. The tests of Gesell will be valuable as achievement indices for small children. Other comparisons are lacking. Dr. S. F. Stewart has been working for a scale. Movies and talkies of motor control also are used.

The above is a suggestive approach with gradation of difficulty of exercises following the theory of motivated movement. Each has been planned to adhere to the visual,—tactile,—auditory,—postural motor reflex development. These are aimed more for a slightly damaged cortex injury.

With modifications for relaxation, more rhythmical repetition of movement may be suggested for severe cortex injuries.

In the slight cerebellar injury (center of co-ordination and equilibrium) movements with objective ends made for co-ordinated gross movements would be consistent with this theory. This would progress to games of skill in the more advanced patients.

Equilibrium is aided by timing visual motor movements of hand, and, of course, walking and sitting, balancing articles on head plus resistance, e. g. sand bags.

CHAPTER X—SUMMARY

Cerebral spastic paralysis results from injury, disease, or faulty development. The prognosis of such a patient is largely influenced by the cause and type of involvement. The symptoms vary according to involvement, also. The extra-pyramidal type is more hopeless than the pyramidal or motor area.

The theories to explain the phenomena of spacticity are still being questioned. The more commonly accepted ones are:

1. Different nerves govern the tonus of muscles than those that control voluntary contractions.
2. Different type of metabolism of muscles exists.
3. Different muscular structures are in action. Sherrington's theory of proprioceptor control is most generally accepted.

One of the important aspects in the treatment is to control the postural and other unrestricted reflex action.

The symptoms of a cerebral spastic patient are usually:

1. Loss of muscle control and inco-ordination,
2. Lack of control over the reflex system,
3. Impaired mentality, and
4. Deformities.

The treatment for this paralysis is indicated from all angles. He is primarily an orthopaedic and neurological patient, but others contribute indispensable assistance.

The orthopaedic measures differ according to accepted theories. In the infant, spinal punctures are often done. During the first 3 to 6 years, measures are taken to prevent deformities and to increase muscular control. Later, operations are done. These are numerous: ramisectomy, neurectomy, tenotomy, tendon transplants, myotomy, tendon lengthening, resection of portions of tendons and muscles, fasciotomy, decompression, Sauter's operation, stabilizations and arthrodeses. They have been used with variations of success.

The medical care aims to lessen acidity, improve organic and glandular function, and assist in quieting nervous reactions.

The psychologist, speech expert, oculist, neurologist, and internist each contribute vitally to the patient's general development.

The therapists—occupational and physiotherapeutic—function under direct supervision of these experts.

The physiotherapist has certain aims in her effort to accomplish neuro-motor control:

(1) Localization of control; (2) Synchronizing the the localizations; (3) Balance adjustments; (4) Extero- and proprio- ceptive response control in relation to environment; (5) Avoidance of positions of deformities; and (6) Social-economic adjustment.

These aims are merely the tools used with as many variations as therapists. However, she must understand what she is trying to develop or repair.

As with the orthopaedists, the fundamentals of procedure are dependent upon accepted theories. Some therapists keep the effort objective, some introspective, and incline to rhythmic or monotonous repetition to accomplish localization. Many use combinations of these approaches.

Certain principles are universally acknowledged: biological sequence in supervised training is desirable, establishing sensory contact is a great advantage, to develop by acknowledging the evolution of motor habits, and psycho-motor relaxation is a constant necessity.

The physiotherapy modality of a warm pool deserves the increasing appreciation it is receiving. It has many psychic and physiological advantages. A general procedure of treatment has been outlined.

Drawing from the theories and facts preceding, suggestions are offered as a physiotherapeutic procedure for treatment of a patient who may have a monoplegic involvement.

CONCLUSIONS

The study leaves one with the realization that it can only be covering superficially, a very complex unsolved problem.

Practically all the material available seems to indicate that the problem is attacked solely from only one angle, whatever one it happens to be. There is a lack of interrelationship of contributions.

From the physiotherapy angle, very little has been published. There seems to be much dissatisfaction in the treatment of these cases. One reason is that there are few ways of actually checking and grading results of

treatment. This may be due to lack of careful classification of types of spasticity and unscientific approach for rating of achievements.

Many problems have suggested themselves:

1. Augment the present physiotherapeutic viewpoint by a study of the follow-up of case histories to include sociological adjustments and problems in adult life.

2. Make a comparative study of different types of involvements to arrive at the answer, whether to make finer distinctions or different approaches for these types. Probably much could be added to our knowledge of neuro-motor control and education.

3. Evolve a comparative improvement basis and scale of improvement to determine the value of different types of technics and modalities.

4. Compare the treatment and progress of these cases with other types of nerve involvements.

5. To make an analysis of the elements conducive to psychomotor relaxation that may be beneficial when applied to the average nervous or tense individual.

Orthopaedic Hospital-School, Los Angeles, California.

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Muscle Training in the Treatment of Obstetrical Paralysis

By Mary E. Trainor

Read before the Sixth Annual Convention of the American Physiotherapy Association. This first appeared in the June, 1927, issue. We have had so many requests for it, it is with pleasure that we reprint it.

Erbs paralysis of the newborn, commonly known as obstetrical paralysis or brachial palsy, is caused by an injury to the brachial plexus, which happens during the delivery of the baby. This injury is of varying degrees, from a slight stretching of the plexus to a complete tear. It is usually caused by a failure of the shoulders to follow the head. To deliver the shoulders, the head is usually drawn to one side. This procedure, though relative safe, often results in injury to the slender roots of the brachial plexus. The upper roots, that is the fifth and sixth cervical, are the first to give away. In very severe injury the seventh and eighth are also involved, and sometimes also the first and second dorsal, giving also a cervical sympathetic injury.

The amount of damage done varies. Sometimes there may be only a slight oedema resulting in a temporary paralysis; and then there may be a complete separation of some of the roots; or there may be an avulsion from the cord itself, resulting in a complete and permanent paralysis of the entire limb. Occasionally we find a double brachial plexus injury. Thus we have two types of brachial palsy. The injury to the upper roots, known as the upper arm type, giving us a paralysis of the deltoid, supra and infra spinati, teres minor, biceps and supinator longus triceps, and occasionally the seratus magnus, coraco brachialis and supinator brevis, and sometimes extensors of wrist and fingers. The arm therefore lies extended by the side of the body inwardly rotated and pronated with sometimes wrist drop and deviation of hand to ulnar side. This gives us a picture of a typical upper arm type of obstetrical paralysis.

The whole arm type often inaccurately called lower arm type, gives us a flaccid paralysis of the whole extremity. With this we get an enophthalmus, with a smaller pupil and narrow palpbrael fissure of the eyes on the side of the injured arm. In either type we frequently find a haematoma of the sterno cleido mastoid on the opposite side.

The paralysis of the deltoid and supra spinatus prevent the baby or child from abducting the arm at the shoulder, the paralysis of the infra spinatus and teres minor prevent the external rotation of the humerus and internal rotation is not possible, because the teres major, subscapula, and latissimus dorsi are already fully contracted, due to lack of oppression. Flexion at the elbow cannot be accomplished due to the paralysis or weakness of biceps, brachialis anticus, coraco-brachelis and supinator longus and the baby cannot supinate partly because the arm is held in inward rotation and partly because of the weakness of the biceps and supinator longus or brevis, or else the total paralysis of the biceps and supinator longus.

If a baby with the upper arm type of obstetrical paralysis is left untreated, we find later the inability to raise the hand to the mouth without raising the elbow; this is caused by the permanent contracture of the internal rotators. These contractures also prevent the child from putting the hand to the head or back of the neck; they are also unable to fully supinate the forearm.

In the neglected lower arm type, these conditions exist and are increased, and in addition the hand is useless, so that we usually find a dangle arm. Here we find the arm undeveloped, giving the appearance of an atrophied arm. Sensation is impaired in the lower arm type, but not in the upper arm type.

Regarding the treatment of obstetrical paralysis, I would say that it should be started early, by this I mean when the baby is a few days old, if treated at home, and by the end of the first week if treated in the out-patient department, as I have seen contractures of the internal rotators as early as the third week. I believe there are few cases where the injury is so slight that there is spontaneous recovery.

The method by which these cases are treated at the Children's Hospital, Boston, is a combination of massage, with passive and active exercises, known as muscle training. These exercises include finger-plays and kindergarten work. The baby must be taught to use the paralyzed muscles. Workers taking up this branch of physiotherapy should be extremely patient and optimistic and have a working knowledge of what they are trying to accomplish. They should be able to gain the confidence and co-operation of the baby almost immediately. The idea of muscle training, as instituted by Miss Jennie Colby, is quite simple. Her idea was that as it is natural for a baby to play, she would make use of this natural tendency to induce the baby to make an effort to use the paralyzed arm.

The treatment at first must necessarily be passive on account of the existing paralysis and inexperience of the baby; but as the muscles gain in power and the baby gains in knowledge, the treatment soon becomes assisted and later active. Simple nursery rhymes are sung to accompany the motions. The baby soon associates the song or rhyme with the motion and makes visible effort to accomplish the motion. Many times bright objects are held before the baby to encourage him to attempt to catch them.

What we must work for from the first treatment until the last treatment is external rotation of the humerus and supination of the forearm; these two motions being the ones least called for during the child's

play. In addition to these, we must necessarily work to obtain elevation and abduction at the shoulder, flexion and extension at the elbow, and any other limitation of motion which we may find exists. I think the most satisfactory explanation of the treatment which I can give is to quote from Miss Colby, who says that "all types and forms of treatment are needed at one time or another." During the first few weeks of life they are necessarily passive movements of the arm as a whole in imitation of the bendings and stretchings instinctively performed by its mate, or by a normal arm. Later these passive movements merge into assisted movements, and then assistance is withdrawn as soon as the child has the knowledge and strength to perform the movements alone.

From three months on, exercises demanding attention are important, not for the purpose of cultivating co-ordination, as with spastics, but to arouse delayed association between the mind and the particular limb, and to localize movements for the purpose of muscular development.

After three years of age, exercises for the obstetrical arm may be the regulation gymnastic arm exercise or shoulder blade movements, and with the addition of exercises for developing skill of hand and fingers if needed.

Attention must be given to the peculiar needs of the individual.

To secure exercises of attention from babies and young children requires resort to some kind of play. "Play educates the baby" and educates the young of dumb animals, and can, and must, in order to procure the most satisfactory results, be used in applying educational exercises to little folks. For the tiny baby I have followed the universal custom of attaching rhymes to the movements of the body. Thumbkins, pointer, etc., for the movements of the fingers; pat-a-cake for the hands, measuring for the arms, with numerous mother plays and finger-plays.

With older, but still little children, I have used the gymnastic movements, the effect of which I have desired, under some name or with some jingle which appealed to the child's imagination: See-saw for arm abduction; ready rockets shoot for elevation, etc.

Daily occupation can be used as therapeutic exercises, if carefully chosen; stirring, grinding, weaving, sewing, pounding, digging, etc. Certain toys are also useful, such as wheelbarrow, toy tetherball and racket, jumping-jack on a string and many another. Games of various sorts readily lend themselves to use as remedial exercises, but to be truly educational they must be adapted to the special needs of the case and the individual. The scientific gymnastic movements should be the foundation of the exercise play.

The question of home treatment and activities often comes up. For the infant obstetrical arm, little if any massage very cautiously given during the first few months. After six months or a year I have allowed it, but not required it.

The obstetrical arms are often too loose jointed to permit of unskilled handling, but as soon as the joint becomes firm enough to be in no danger of dislocation, the arm should be exercised by the mother, and the baby taught, day by day, that the paralyzed arm must do what the other arm does. Week by week, and month by month, this teaching constitutes the principal part of the home exercises, the other arm being the guide for progression. The little gymnastic exercises arranged for both arms and associated with some nursery rhyme have a certain value, and the mother usually learns them readily, and applies them with the necessary enthusiasm for holding the child's attention. There must be constant vigilance in having the child use the arm in its play and work year after year if a perfect recovery is sought.

The task is comparatively easy, because there is little danger of over-doing and almost no danger of wrong-doing. Less watchfulness is required with the obstetrical than with the polio subjects, and while they need constant urging, there is usually but one limb to consider and only a few definite movements to require.

As the disinclination to use the arm is inattention, rather than inco-ordination, it is more readily overcome.

Fatigue with an obstetrical arm needs consideration only as regards age. The tiny baby must be guarded carefully; the ten-year-old child may be allowed normal activity. The frequency of treatment must be governed by circumstances. Short treatments daily by a skilled operator for the first two years would be ideal; three times a week gives very good results; twice a week will accomplish something; less than this is hardly worth considering, except to keep watch and inform the parents as to pending dangers.

Treatment should be continued as long as the child responds to it, with occasional interruptions after the second year.

I will add that of recent years we are seeing more of the whole arm type of obstetrical paralysis. These we treat for a few weeks or a few months and if the muscles show no response to treatment, the plexus is explored surgically. Following the operation the baby returns for muscle training. In many of the old untreated upper arm type of obstetrical paralysis, we find a backward sublaxation of the head of the humerus, due to the contracture of the internal rotators and paralysis of the external rotators. Sometimes we find also a hooking of the acrominum. These children are given a few weeks of muscle training preliminary to a tenotomy of the internal rotators and possibly an osteotomy of the acrominum. Post operative treatment is started while the child is still in the ward, about the sixth day, and continued until the condition of the arm is satisfactory, or until response has ceased. After those cases are discharged they should report for observation every six months. Frequently the weak muscles lose some of their power, as their antagonist is and has been so much stronger from the beginning. A few weeks' treatment will bring up the power again.

I will endeavor to give you a mental picture of the baby being given his treatment. The baby is laid upon a bed or padded table, upon his back, and the arm undressed. Beginning with the fingers and working up the arm and over the scapula, massage is given to increase circulation, nutrition, and neuritiom and to prepare the muscles for action.

We will now begin the motions of the fingers. The thumb and each finger is taken separately and then collectively is flexed and extended, while the worker sings some kindergarten song or nursery rhyme, such as:

"This is little Tommy Thumb
Round and fat as any plum;
This is little Peter Pointer
Surely he's a double-jointer;
This is little Toby Tall.
He's the biggest one of all;
This is little Ruby Ring.
She's too fine for anything;
And the little wee one maybe
Is the little finger baby."

Collectively we sing:

"The little birdies in their nests
Go hop, hop, hop, hop, hop;
They try to do their very best
And hop, hop, hop, hop, hop."

This is just an example—any suitable rhyme may be used—but it must be sung with life and enthusiasm so as to impress it upon the baby's mind, so that he may associate the rhyme with the motion.

I have seen babies as young as five weeks try to extend and flex their fingers to this little song after hearing it only once.

Apposition Thumb:

"Thumbkins and Pointer say how do you do," etc.

Extension of Wrist, or flexion, sing:

"This way, that way, blows the weather vane,
This way, that way, blows and blows again;
Turning, pointing, ever showing
How the merry wind is blowing."

The emphasis is, of course, always put on the motion necessary to train the weaker muscles.

Supination:

"Roll over, roll over, so merry and free,
My playfellows dear, come join in my glee."

Flexion and Extension at elbow:

"Up, down, up, down,
This is the way we go to town;
What to buy? to buy a pig;
Home again, home again, rig—a—gig gig."

Sidewise extension of arm, or yard C position of Educational Gymnastics, excepting we supinate the forearm.

One yard of ribbon; two yards of ribbon; three yards of ribbon and four yards of ribbon; tie a big bow on your hair.

Elevation: Educational gymnastics, arms upward stretch 1, 2, ready rockets, s-h-o-o-t. Repeat 6 or 8 times.

Abduction: Hold the arm externally rotated, semi-flexed at elbow with forearm in supination. Bring the arm to full abduction and then to body, somewhat after the manner of the old-fashioned pump, sing:

Pump the water, pump the water,
Pump, pump, pump.

External Rotation: Hold the forearm flexed at right angles in front of body, with forearm supinated and upper arm close to body. Then carry the arm back till the thumb touches the table, return to starting position while singing:

"Grind the coffee; grind the coffee,
Grind, grind, grind." (Repeat.)

Circumduction: While circumducting the arm, sing:

"Crank the auto, crank the auto,
Crank, crank, crank."

While this covers all the motions of the upper extremity, each case requires special emphasis on different motions. This rests with the condition of the arm, and must be left to the physiotherapist's judgment, or the doctor's prescription for treatment.

Where one finds a contracted pectoral, sub-scapularis, or teres major, one must make sure to fix the scapula while elevating and externally rotating the humerus. A contracted pectoral in a baby is readily overcome by faithful treatment. The older babies and children seen (one to twelve years) usually have, in the upper arm type, contractures of the pectoral, subscapularis and teres major, and sometimes of the pronator radii teres. These cases, in addition to the treatment described, are put up in a wire airplane splint, which fits over the pelvis and holds the arm in position of external rotation, semi-flex at elbow and supination. These children are given hanging on stall bars.

In the whole or lower arm type, it is advisable to give about three months' treatment. If the fingers show no signs of recovery, it is well to discuss with the doctor the question of exploration and possible repair of the brachial plexus. The parents must be made to understand that operation is not a cure for the existing paralysis, but is a means of help, and if the surgeon finds the plexus torn and repairs it, or merely cleans up the entanglements sometimes found existing around the plexus, he will give us a chance to help the baby and that following the operation treatment must be given faithfully three times a week for a period of years. No improvement is hoped for before a year. I have seen many of these babies begin to flex and extend their fingers in the slightest degree in about six months. Improvement is very slow. It takes them about three years to develop power sufficient to build blocks. (We use the two inch colored cubes.) We now teach them, besides building blocks, to put large colored pegs in a peg board and to string beads, using the larger kindergarten beads. After the exercises are given, the arm is again given some massage to rest the muscles.

Children naturally are imitators and live in the land of make believe. If the physiotherapist has imagination and sufficient sympathy and co-operation with the child, she will find the child the greatest help in improvising games. All she will have to do is to direct the execution of movements so as to bring into play the muscles which she wishes to develop. Never deceive a child! If one is tactful and sufficiently patient and sympathetic, one can get the child to try to do anything and to allow one to exert considerable strength in stretching contractures.

The prognosis of upper arm cases is good, provided the treatment is started early and carried on faithfully. They all can elevate about to normal degree; abduct normally and use the hand well. Their supination and external rotation varies.

In the whole arm type we promise the parents nothing, more than a clear conscience, if treatment is given regularly; they all gain something; a few have good arms and another few practically normal arms.

Boston, Massachusetts.

Abstracts

By John S. Coulter, M. D.

Proper Place for Physical Therapy in the Treatment of Fractures. Clay Ray Murray, M. D., Assistant Professor of Surgery Columbia University College of Physicians and Surgeons; Associate Attending Surgeon, Presbyterian Hospital in the City of New York. In Jour. A. M. A., 97:4:235, July 25, 1931.

The treatment of fractures is today an economic problem. End results are to be estimated in dollars and cents. The criteria by which results are evaluated are residual disability and deformity and the time taken to secure the end-result.

I am convinced that physical therapy, properly used, can be of great value in minimizing residual disability and deformity and in cutting down the period of treatment necessary to secure an end-result; I am equally convinced that, as generally practiced the country wide today in fractures, it frequently accomplishes neither of these objects but results in increased residual disability and prolongs the time needed to secure the end-result.

The fault lies, as I see it, in a generalized failure to realize (1) what treatment of fracture is intended to do, (2) what physical therapy can and cannot do, and, (3) what part the patient plays in the treatment. The fault is shared equally by the physicians and the physical therapists to whom they send the patients. The result is commonly the neglect of physical therapy during the stage of treatment when it is most valuable, and the attempt in the later stages to substitute physical therapy for the patient's part of the treatment.

I feel that physical therapy as a method of treatment in fractures can be put on a sound logical basis. One might ignore for the moment the various means of carrying out the treatment and consider what it should do to be of value. The ideal treatment of a fracture would embody the immediate anatomic replacement of bone fragments without mental or physical trauma to the patient and the immediate abolition of all pathologic changes in the bone and soft parts without the slightest interference with the usual function of the part or the usual life of the patient. The problem in each fracture is to approach this unattainable ideal as closely as one can. This is accomplished in general by early reductions under anesthesia, by the employment of a minimum of immobilization for as short a time as possible and by allowing and encouraging the active use of the part within pain limits as soon and as often as possible. As a whole there exists an extensive pathologic process: torn and thrombosed vascular and lymphatic channels, lacerated tissues, infiltrated by hemorrhage, inflammatory exudate with its cellular constituents, and the transudate of edema from circulatory and lymphatic obstruction. More than that, the organization of such infiltration into tissue is rapid. It is measured in hours and days—not in weeks and months. It can be dispersed while it is exudate, hemorrhage and cellular infiltration and this is the time to attempt to get rid of it, not after it has become organized and can no longer be dispersed.

How is it to be removed from the part? There is only one mechanism—circulatory. 1. The bone lesion should be treated by early reduction under anesthesia, with a minimum of trauma, and by as inextensive an immobilization as possible in apparatus that will allow of the maximum early active use of the part within pain limits. 2. Appropriate physical therapy should be used from the beginning of treatment.

After reduction, the use of moderate elevation aids circulatory efficiency, but it is here that proper physical therapy can render the part practically free from pathological changes in a few days. This makes valuable the use of methods of postreduction treatment which allow of ready access to the part.

In cases in which some form of traction suspension is used this is readily attained, but it is as readily attained in many cases in which various forms of splints are applied after reduction. One of my chief objections to the use of circular plaster after reduction is that it frequently shuts off the part from the early use of physical therapy.

The more recent researchers, clinical and experimental, on the healing of fractures have made it apparent that the question of delayed union and nonunion may be closely related to the circulatory status, not of the bone but of the part as a whole. This adds an important reason for the use of early physical therapy.

Physical therapy helps to minimize the chances of delayed union and nonunion. It prevents the organization of scar tissue in muscle and soft parts, about vessels and nerves, in joint capsules and about tendons.

What is the appropriate physical therapy for these cases? It is, and should be, of the simplest type: elevation of moderate degree, heat, massage and stimulation of the muscles.

Heat can be employed in any form. I use the therapeutic lamp, diathermy and ordinary light bulbs set up under a cradle. The essential feature is that it shall be of relatively low intensity over a considerable period of time.

The massage used should be of one type only: a light stroking massage as described by Mennell. It is best described as the type of movement used in gently stroking a cat's back.

The muscular stimulation must give a slow rhythmic contraction without spasm. It is difficult to do this with ordinary galvanism or faradism. The Bristow coil is better, the newer Smart coil is better than the Bristow,

and an instrument known as the myo-neurostat, which gives a surging rapidly interrupted galvanism, automatically operating at any given strength, frequency of interruption and rapidity of surge by means of a contained motor, has proved excellent. A sinusoidal surge can give satisfactory results. The purpose is to provide a substitute for active motion when that is not possible. It should be painless and not cause spasm. Physical therapy that hurts the patient or produces muscle spasm has no value. It is actually harmful.

Physical therapy will never restore function to a part. The regaining of function is the patient's job, and once he is given the erroneous idea that the physician can regain it for him, the groundwork is laid for prolonged convalescence and impaired end-results.

Active motion within pain limits is the means of regaining function: guided active motion; gently resisted active motion; active motion with the patient's mind contrated on some useful, purposeful aim, rather than on the actual motion that he is making. This is much better than aimless exercises. Passive motion is a confession of inability to secure active motion.

Anything that makes it easier for the patient actively to exercise function is good physical therapy if he understands that its sole value to him lies in that help. If he sits by and does nothing but receive physical therapy three times a week for fifteen minutes or half an hour, as thousands of them do every day, his dependence on physical therapy is doing him harm.

Ultraviolet Irradiation in the Treatment of Fractures. Prof. M. Ponzio, Director of Mauriziano Radiological Institute of the Hospital Humbert I, Turin, Italy, in Radiology, xvii:4:792, October, 1931. (Translation by E. T. Leddy, Rochester, Minn.)

Recent experiments of Schultzer and M. Clevdon on phosphorus and calcium metabolism in animals on a fixed diet, but irradiated with ultraviolet or given irradiated oils, have shown that the initial figure for calcium was doubled after treatment; similarly, the experiments of Lesne, Turpin, and Zirive on white mice irradiated with ultraviolet showed that the level of organic calcium was raised markedly. Springer and Taradieu have confirmed these experiments and conclude that ultraviolet radiations have a eutrophic action manifest all over the body, but especially in their ability to raise the total calcium level. This action according to Mouvriquand, Bernheim, and Teobalt, is present more or less throughout the whole range of the ultraviolet radiations.

Detailed experimental observations have shown that ultraviolet produces an immediate calcemia which is due, according to Kraus and Zoudek, to a rise of the hydrogen ion concentration of the blood. This calcemic state, according to Atzler and Gunter-Lehman, is produced either by a direct action of the ultraviolet or by an indirect effect by vasodilatation and greater circulatory activity. This hyperemic stage is followed by processes of fixation of calcium and of phosphorus, probably because of the activation by ultraviolet rays of the cholesterin in the blood; and this is, according to Windhaus, by transformation of it into vitamin D.

It is logical to suppose that even the completed process of calcium fixation should be more lively and active, and this is of especial importance in cases in which there are notable changes in calcium balance. Such considerations have led many investigators to try to combine the administration of calcium and of ultraviolet in cases having severe osseous decalcification such as occurs in osteomalacia, tuberculous processes, etc. The observations of Rosen, of Weil and Guillaumin, of Worringer, of Rothmann and others on the metabolism of calcium and its fixation by means of ultraviolet in cases with tuberculous osseous lesions and especially the recent observations of Clavelin and Sicard on various osteo-articular affections, have shown that this theoretical conception may have a favorable application in a practical way, and the results obtained seem to recommend the method most highly.

The experimental and clinical results obtained in this field have led us to try the method on surgical cases of pathologic fracture in which the retardation in callus formation was specially well marked.

Dr. Conte, assistant at the Institute, did some experiments on rabbits in which the diaphysis of a long bone, especially the femur, was fractured by puncture in such a way that the fractures resulting were quite similar in all the animals used in the experiment. Some of these animals were taken for controls; others received intravenous injections of calcium chloride; others received ultraviolet irradiation, and still others had a combination of ultraviolet and calcium. The injections and the radiation were carried out on alternate days after the fifth day from the beginning of the experiment until the thirty-fifth day, at which time the animals were killed.

The intravenous injections were done into the marginal vein of the ear, which had previously been made hyperemic. The strength of the calciumchloride solution was increased progressively from 1.5 per cent to 2.5 per cent; 5 c. c. were injected at a time, a total of ten injections being given. The irradiation of the animals was carried on immediately after the injections.

During the period of observation the behavior of the callus was checked up by radiographs aften ten, twenty and thirty, and thirty-five days, respectively, during which time the callus had definitely consolidated.

Examination of the sets of radiographs showed, first of all, that there was no difference in the callus in the control animals compared with those receiving only the intravenous injections of calcium or only the ultraviolet treatment, but there was a definite difference in the animals which had received combined intravenous and ultraviolet treatment. The difference was to be seen at various stages of the experiment, but was especially well marked in the terminal period (thirtieth to thirty-fifth day), when the activation of the process of repair was most manifest.

These experimental observations led us to start, on our hospital service, a series of treatments with combined calcium and ultraviolet, in which we selected a series of fractures in which callus formation was retarded or defective. We carried out the first experiments by giving the calcium orally, using mostly chloride of calcium, tricalcine, and other calcium preparations, giving them in variable quantities two hours before irradiation. In a few cases, the calcium chloride was given by rectum (200 c. c. of 5 per cent solution). The irradiations were made daily, limiting them to the injured member at the site of the fracture. A second series of patients were irradiated after they received a hypodermic injection of calcium a quarter-hour before ultraviolet irradiation. Only a few cases were given intravenous injections of calcium chloride in 1.5 per cent solution, because many patients were reluctant to take such a treatment continuously.

The cases treated confirmed the clinical and radiological results of the experiments on animals. Combined treatment was more efficacious than the simple administration of calcium salts or of opotherapeutic preparations.

The administration of calcium salts hypodermically has been found to be the best of all methods and easy to

carry out in definite dosage. We generally used calcium chloride 5 per cent in 5 c. c. solution; in a few cases we used serum and calcium mixed (3—4 c. c.).

Further experiments are in progress to find out at what period ultraviolet irradiation is useful in delayed healing of fractures, especially in open infected fractures, and to find out whether, in these cases, the combined treatment may offer any advantages.

Actinotherapy at Tuberculosis Dispensary. Abstract in Jour. A. M. A., 97:6:425, Aug. 8, 1931, from Lancet, London, 1:1182, May 30, 1931.

According to Jessel, artificial light treatment can be successfully given at tuberculosis dispensaries under the control of local authorities. It is especially useful in cases of lupus and allied skin conditions, adenitis with or without softening, and other superficial conditions.

It is much less effective in the treatment of tuberculosis disease of the larger joints and bones, which should be treated in special residential institutions.

In the treatment of lupus a combination of general light therapy with local treatment (e. g., Kromayer lamp) is usually necessary and the carbon arc bath is to be preferred to the mercury vapor lamp for general irradiation. Prolonged exposure to weak carbons is preferable to brief exposure to strong cored carbons. It is efficacious, safe and particularly suitable for use by tuberculosis officers who have other duties to perform outside their dispensaries.

To obtain the best results, actinotherapy needs frequently to be combined with various forms of local treatment, e. g., the use of suitable caustics in lupus and the aspiration or incision of abscesses.

A Study of Intestinal Tuberculosis. W. Claude Davis, M. D., Tucson, Arizona, in Southwestern Med., xv:7: 305-309-310, July, 1931.

It is impossible to over-emphasize the value of rest in the treatment of intestinal tuberculosis. It is this author's opinion that no form of treatment is known that will with consistency favorably influence this disease except where a regimen of rest is strictly observed.

The favorable influence of general (rather than local) irradiations by the actinic rays produced by the mercury quartz vapor or carbon arc lamps is extremely gratifying. However, reliance upon this form of treatment without emphasis being placed upon the need of bed rest, is not justified. When the two are combined improvement may confidently be expected, except in the near terminal group. No attempt will be made to discuss in detail the technic of this form of treatment. The literature abounds with detailed instructions.

Abatement of symptoms and lessening of x-ray evidence of spasm and hypermotility may be expected in three to six weeks. The lessening of discomfort caused by excessive gas in the intestinal tract, which is often the only symptom present, is most often the first sign of improvement. The control of this particular symptom constitutes the greatest problem in relation to the comfort of patients.

It is often desirable to utilize ultra-violet therapy in the patient's home. Many patients find the cost of the mercury quartz vapor lamps prohibitive. In these instances the carbon arc lamp may be recommended, as the first cost is much less and treatment results compare favorably. The increased popularity of the carbon arc lamp in the last few years has been marked.

Natural heliotherapy, except in those instances where there is no pulmonary tuberculosis disease, is emphatically contraindicated. Primary tuberculosis infection of the intestinal tract is rarely seen, but when encountered natural heliotherapy may be considered. Use of the actinic ray should be continued for a number of months after all clinical and x-ray signs of the disease have disappeared.

The Alvarez diet which is cellulose free, easily digested, non-gas forming and of high caloric value, meets the requirements of those patients whose intestinal disease is marked by more than moderate x-ray signs of spasm and hypermotility, and having clinical manifestations, such as discomfort caused by excess gas formation, loose bowel movements, et cetera.

When anorexia or poor appetite is a feature, pure olive oil may be given.

Orange juice is usually well borne but may be alternated with tomato juice which is equally well borne and supplies qualities deficient in a strict Alvarez diet.

The nearest approach to a normal diet possible, always eliminating foods that are known to cause discomfort, is the diet of choice.

Sweet milk is often the cause of increased gas formation and resultant discomfort.

Calcium Chloride Therapy: Examination of healed tuberculous ulcers of the intestinal tract discloses that the healing process is quite different from that of tuberculous areas in the lung or glands, in that calcium deposition has no part in the healing of the intestinal ulcer. Calcium chloride administered intravenously seems to cause an amelioration of symptoms such as gas pains, intestinal colic, diarrhea, and often favorably influences the appetite. It should be remembered, however, that its value is found in its beneficent influence upon symptoms and not in its curative powers. Its greatest field of usefulness will, therefore, be found in the first few weeks of treatment, before rest and the actinic ray have themselves brought comfort to the patient. Calcium administration should rarely be indicated longer than three months. The dose is five cubic centimeters of the five per cent solution given intravenously bi-weekly.

Ultraviolet Light in Tuberculosis of the Larynx. Benj. Katz, M. D., Los Angeles, in Arch. Otolaryng., 14:1:9, July, 1931.

Technic of different methods.—By the proper technic the ultraviolet rays of sunlight can be applied to the treatment for laryngeal tuberculosis.

The best time for the sun treatments is between ten and eleven a. m. To avoid sunburn of the larynx it is advisable to begin the treatment with exposures of two to three minutes, gradually increasing the time to ten minutes. The method of reflecting the sun's rays into the larynx by a system of metallic mirrors is easily understood from Fig. 1. The patient is seated on a chair with his back to the sun; the rays are reflected into his mouth by a metallic mirror. By manipulating a small laryngeal mirror in the same way as in the laryngeal examination, the patient reflects the rays into the larynx.

The treatments are performed every day with short intervals of rest whenever signs of irritation arise.

Edgar Mayer uses a direct method of applying artificial ultraviolet rays to the larynx. The source of radiation is a lamp with a small mercury quartz water cooled apparatus similar to the Kromayer lamp. This lamp can be easily handled and is not too large for insertion into the mouth. Mayer reported thirty-five cases of laryngeal tuberculosis in which this method gave encouraging results.

The work of Wessely of Vienna, published in 1924, can be mentioned as one of the latest developments in

artificial light therapy. His method consists of direct irradiation of the larynx with artificial ultraviolet rays by means of the Seiffert universal direct laryngoscope. This method is complicated, requiring a suspended laryngoscope for every treatment.

Modified technic.—Having found the last two points worthy of consideration, I modified the technic by directly inserting into the larynx a long rod-like quartz applicator attached to a Kromayer lamp. This quartz applicator introduced through a direct laryngoscope, with a small electric globe attached, makes possible direct contact of the ultraviolet light with the affected area under the control of the eye.

Comment

Laryngeal tuberculosis is part of a general tuberculosis. Therefore, improvement of the larynx depends most of all on the general condition of the patient. That general irradiation with ultraviolet light is beneficial in tuberculosis has been proved by many authors. The improvement depends on the change in calcium metabolism. While some think this general action of light is the most important, the experimental and clinical observations mentioned prove that the local action is also of significance.

As far as the larynx is concerned, my contention is that treatment with ultraviolet light is of value as an auxiliary measure.

Although some physicians depend only on ultraviolet light in treating patients for tuberculosis of the larynx, I am not enthusiastic about resorting to this method alone.

If ulceration of the larynx is present, treatment with trichloracetic acid is indicated, as I described in a previous article. In cases of edema or infiltration, electrocauterization is the method of choice. Because the pain and inflammatory reaction after electrocauterization depend to a certain extent on secondary infection of the wound, it is my practice to cover the cauterized area with trichloracetic acid immediately after electrocauterization. This acid forms a white slough on the wound which prevents secondary infection with ordinary tuberculosis germs. The application of the acid likewise decreases pain from the reaction and increases the subsequent shrinkage of the infiltration or edema.

Tuberculous Peritonitis: Treatment by Heliotherapy at High Altitudes. Abstract in Jour. A. M. A., 97:6:428, Aug. 8, 1931, from Revue Franc de Ped., 7:174, 1931.

On the basis of numerous and extensive observations, Cappelle draws the following conclusions: 1. Pleuroperitonitis is the most frequent manifestation encountered at the beginning of tuberculous peritonitis; diverse degrees of pleural reaction may precede, accompany or follow the peritoneal attack (95 cases presenting pleural reaction among 150 patients). Most vigilant care must be given by the practitioner to the condition of the pleura in a patient during the whole course of the illness. 2. Tuberculous peritonitis is a condition in which, generally, surgery is not indicated. Surgical interference should be applied only in the case of appendicitis or intestinal obstruction. Laparotomy has a therapeutic indication when the patient cannot be placed in necessary climate environments for solar treatment of his peritoneal condition. 3. The prognosis of tuberculous peritonitis depends on the amount of the urinary output. Each crisis observed does not lead to recovery except by increasing the quantity of urine, the stimulating action of the climate being aided, if necessary, by calcium chloride or by subcutaneous injections of dextrose. 4. Tuberculous peritonitis is a condition that is cured in almost every case in which the patient can benefit for the desired length of time from the solar treatment at high altitudes. Heliotherapy should not be given to patients during a crisis; i. e., those presenting, with a weak general condition, marked transitory disorders (especially diarrhea), various painful paroxysms and a temperature above 38.5 C. (101.3 F.) on the average. In such cases the climate of the high altitude, as well as the aeration, the medical supervision and various adjuvant drugs may correct the most desperate conditions. Heliotherapy may be given without limitation or interruption in all cases of chronic tuberculous peritonitis, regardless of the amount of fibrous peritoneal exudate or ascites to be exposed to the rays. The facts, observed and the results reported fully justify the conviction that patients under proper medical supervision are able to stand daily from four to five hours of insolation. 5. The solar cure at high altitudes, applied in the treatment of tuberculous peritonitis in the group of adolescents studied by the author, gave complete recovery in 82 per cent of the cases, without sequelae. It brought about a complete change in the patients, allowing 92 per cent of them to recommence a normal life.

Tuberculosis of Joints. Conservative Plan of Treatment with Presentation of Patients. C. Wilbur Mercer, M. D., Kansas City, Missouri, in J. Missouri M. A., 28:9:427-428-429, September, 1931.

Treatment.—Early recognition of the disease with the institution of adequate measures of treatment promptly and efficiently will materially hasten recovery or arrest of the disease and preserve many good functional joints without great deformity. This is especially true in children when time is not a factor and there are no dependents. We believe that all cases of tuberculosis of the joints should be treated in recumbency until after the subsidence of acute symptoms and then some ambulatory method employed.

The first indication is fixation of the joint, with traction in the line of the deformity for correction of the existing deformity, with placing the limb in position of election in the event bony ankylosis occurs, which is the method of cure in cases with much bone destruction. After the subsidence of acute symptoms, some ambulatory method of treatment is instituted, either plaster of paris casts or braces, preferably bivalved casts because these allow access to the involved joint for the application of local measures and are least apt to be disturbed by the patient or parents. Tuberculin is given all cases when it can be borne and is not contraindicated by sepsis and temperature. Bacillen emulsion is used. The doses are gradually increased until the patient is able to take one milligram at a dose without untoward symptoms. When accessible, all joints are aspirated, tuberculous materials or debris drawn off and the joint injected with Calot's paste, 5 to 20 c. c.

After aspiration a pressure pad and snug bandage are applied. The formula of the paste is, camphor phenol 6 parts, guaiacol 8 parts, iodoform 10 parts, and lanolin 100 parts. If fluid recollects in the joint, aspiration and injection of the paste are repeated as often as necessary.

Abscesses should never be opened surgically unless there is severe pressure because of the danger of mixed infection. They should be aspirated and the tuberculous pus withdrawn, followed by injection with Calot's paste and the application of pressure pad to favor obliteration of the abscess cavity. If the cavity refills, the aspiration and injection are repeated, some cases requiring this

treatment many times before the abscess entirely disappears. Heliotherapy as advocated by Rollier is used in all cases during the favorable months and during the cold months exposure to the quartz lamp is practiced.

If we remember that tuberculosis of joints is secondary to infection elsewhere and treat the patient, urging and seeing the fulfillment of the best hygienic measures, the most nutritious food, fresh air, light and sunshine in abundance, amid happy and pleasant surroundings, we are lending every necessity for the recovery of patients afflicted with this serious disease.

Tuberculosis of the Skin. Cleveland White, M. D., Chicago, Illinois M. J., LX:3:215, September, 1931.

The use of the alpine lamp, dietary measures, medication with phosphorized cod liver oil, and surgical electric-thermy comprise probably the best and most conservative management at the present time. Of course, in many cases, the general treatment of the patient is of extreme importance. In some patients, the general management which is necessary in internal visceral tuberculosis is applicable when the skin is manifestly secondarily involved.

A brief discussion of some of the new dietary measures is indicated—the following notes are freely quoted from Andrews. A diet low in sodium chloride, protein and carbohydrate and rich in fats and vitamins was devised empirically by Gerson. Dr. Edgar Mayer stated "that definite healing was observed in advanced cases of lupus vulgaris of the face and mucous membranes that had previously been resistant to all other forms of accepted treatment. . . . These results were far more striking than those claimed for other forms of tuberculosis. . . . Within a few days after the beginning of the treatment a retrogression of the swelling and a change in the color in the vicinity of the lupus nodules were often noticed."

It is generally accepted that phototherapy heretofore has given the best results of any method yet employed. Radio therapy (x-ray and radium) is being discarded by more and more able men, although complete cures are apparently established in isolated cases.

Common Dermatoses of the Face. Ida J. Mintzer, M. D., Jamaica, N. Y., in N. Y. State M. J., 31:14:897, July 15, 1931.

From the Dermatological Department of the New York Post Graduate Medical School and Hospital, George M. MacKee, Director. Read before the Medical Society of the County of Queens, Forest Hills, N. Y., Feb. 24, 1931.

Freckles.—The treatment consists of peeling the epidermis. Bichloride of mercury applied as a lotion in the strength of one half to four grains to the ounce of water or alcohol, dabbed on two or three times a day is of benefit. Hardaway touches each freckle with a needle connected to the negative pole of the galvanic battery.

Chloasma.—The local treatment consists in peeling the epidermis with lotions containing salicylic acid or bichloride of mercury, or letting strong soaps stay on the patch at night in the form of a plaster. When the latter is used it is washed off in the morning and cleansed with carbon tetrachloride 5 per cent in alcohol, followed by a lotion containing bichloride of mercury 1:1000 or salicylic acid, 2 per cent in alcohol.

Hypertrichosis.—When the hairs are large, electrolysis is the only safe treatment. Radiotherapy should never be used because of the possible sequelae of radiation.

Acne Vulgaris.—The treatment should be constitutional as well as local. Fats and carbohydrates should be reduced in the diet, and water taken freely between meals. Locally, the patient should be advised against the use of greasy creams. Of the remedial agents, sulphur 2 to 8 per cent is the best, and may be used in the form of an ointment or lotion. One of the most valuable methods of treatment, is to stimulate the sluggish skin until a mild dermatitis is produced. This is accomplished by washing the face with tincture of green soap and hot water for three or four successive nights, and applying an ointment containing sulphur or resorcin, 5 to 60 grains to the ounce of lanolin or cold cream. When reaction occurs stop treatment and apply soothing applications as zinc oxide in liquor calcis or calamine lotion.

Roentgentherapy in acne gives excellent results.

Ultraviolet light is useful, especially where the affection is superficial, acutely inflamed, and no notable comedones; but recurrences are the rule, and so far no other form of treatment has given the good and fairly rapid results obtained by the x-rays.

Rosacea.—The dilated venules may be treated by electrolysis, which is the method of choice, scarification or electrodesiccation. Distance application of ultraviolet light twice weekly, with first and second degree reactions are beneficial. In the third or rhinophyma stage, the early lesions can be cured by bipolar endothermy. Each nodule or enlarged sebacious gland is penetrated with the needle and the current is then turned on for the time necessary for coagulation. After several treatments the nodules contract and the nose gradually returns to normal. At this stage fractional doses of unfiltered x-rays given weekly for several weeks may prevent a recurrence.

Eczema.—The treatment during the acute stage should consist of local applications of soothing oils and creams, until the acuteness subsides, and in addition it is desirable to apply subfractional doses of x-rays to each cheek and occasionally to the forehead.

Erysipelas.—Locally, constant wet dressings of boric acid solutions, or saturated solution of magnesium sulphate, or aluminum acetate, etc., is soothing to the patient at first, though later may cause discomfort. Icthyol in ointments or in aqueous solution, 10 to 25 per cent is very popular.

Impetigo Contagiosa.—All that is necessary is strict cleanliness with soap and water, and the application of ammoniated mercury 3 to 10 per cent, two or three times daily. In the stubborn cases ¼ to ½ skin units of unfiltered x-rays frequently hastens the cure.

Sycosis of the Beard. In some patients rapid involution is caused by a 10 per cent ammoniated mercury ointment, without even manual epilation, whereas in others, permanent alopecia established by x-rays, together with all kinds of local antiseptics and vaccines fail to result in a cure.

Tinea Sycosis.—This is not a common disease. No other single remedy is as effective in this disease as x-rays.

Dermatitis Venenata.—The treatment in the acute stage when edema and vesiculation are present, is soothing wet dressings. This may be changed to astringent preparations, as carbolated or mentholated calamine lotion when the acute symptoms subside. In the case of dermatitis caused by poison ivy the patient may be immunized with small doses of rhus toxicodendron during the poison ivy season.

Lupus Vulgaris.—The systemic treatment is of great importance. This should consist of generalized ultraviolet light baths, cod liver oil, nutritious food, rest and outdoor life. Locally, complete destruction of the diseased patch by electrodesiccation and thorough curett-

ment followed by ultraviolet is probably the most effective treatment.

Lupus Erythmatosus.—The treatment of lupus erythmatosus has been more successful in the past few years, since the addition of the various good preparations to our therapeutic realm. Radium and x-rays should not be used because of the possible radiodermatitis and its sequelae.

Molluscum Contagiosum.—The condition is treated simply by the manual expression of the molluscum body from each individual lesion, and by applying carbolic acid to the central cavity with a toothpick, or the lesions may be treated by cirettage, followed by painting the bases with carbolic acid or iodine.

Verruca Plana Juvenilis.—Daily painting with a salicylic acid in collodion, 1 to 8, or rubbing with an ointment containing 5 per cent of both salicylic acid and resorcin is generally successful.

Nevus Flammeus.—The best treatment for this condition is carbon dioxide snow. Many authorities advocate the compression technique with the Kromayer light, though equally good results follow distance radiation with the air-cooled ultraviolet light. With either compression of distance therapy, blistering doses are necessary, and should be repeated at frequent intervals before the erythema of the preceding treatment subsides.

Angioma Cavernosum.—Radium gives such good results that it is the method of choice.

Fleshy, Pedunculated Soft Moles.—Freezing with ethyl chloride, and clipping it from the base with a pair of small scissors.

Nevus Pilosus.—In all hairy nevi the hairs should first be removed by electrolysis. The larger moles may be removed by transfixing the lesion in several directions with the needle attached to the negative pole, using a current of 2 to 3 ma.

Black or Bluish Black Moles.—These are the most dangerous type of nevi from the standpoint of malignancy. The treatment should be most radical. The best method is to remove the lesion intact with the high frequency cutting current, circling wide for one-half or three-quarters inch out from the lesion. Radium is then applied to the original site of the lesion, and to the surrounding area, as well as heavy doses of filtered x-rays to the glands which drain the affected site. The endotherm knife is preferable to the ordinary surgical incision in that the lymphatics and capillaries are sealed by the heat.

Basal Cell Epithelioma.—Electrocoagulation and curettment is an ideal procedure. It is not only a rapid but thoroughly destructive method and leaves a minimum of scarring.

Prickle Cell Epithelioma.—Surgical removal with the endotherm knife, followed by radium to the primary site and heavy doses of filtered x-rays to the glands which drain the affected area give the best results.

Treatment of Psoriasis. Continued Observation on the Use of Crude Coal Tar and Ultraviolet. William H. Goeckerman, M. D., Rochester, Minn., in Archives of Derm. & Syph., 24:3:446, September, 1931.

Patients with psoriasis are usually hospitalized when they come to the Mayo Clinic because most of them come from a considerable distance and hospitalization permits more perfect control of the details of technic. Hospitalization, however, is not necessary, and under many conditions ambulatory treatment may be preferable.

Under hospital conditions, an ointment containing from one to five per cent crude coal tar is applied about one-eighth inch (3 mm.) thick to the various patches, whether large or small. The formula for this ointment is as follows:

crude coal tar from 0.5 to 1.5 drachms (2 to 6 cc.)
zinc oxide, one ounce (30 Gm.)
petrolatum to make four ounces (about 120 Gm.)

The ointment is permitted to remain on the patches until the next day, up to the time at which the technician who operates the air cooled quartz lamp is ready for the patient's exposure. The excess of the ointment of crude coal tar is then removed with olive oil; a thin film, enough to look like a brown stain is purposely allowed to remain. These stained patches are then exposed to the quartz lamp, beginning with a light exposure so as to avoid any particular reaction from the light. With the ordinarily employed well functioning lamp, a beginning exposure of one minute at a distance of 30 inches (76 Cm.) is practicable. The exposure is given daily, and is lengthened by one-half minute until from four to five exposures have been given. The average patient has now acquired considerable tolerance, and the time of exposure may be lengthened rapidly and the distance shortened. There is no necessity for producing severe erythema; gradual tanning is the object desired.

Summary and Conclusions

The use of tar and ultraviolet in the treatment of psoriasis is the outgrowth of a persistent effort, not to "cure," but more effectually to control individual attacks. There is no evidence that this treatment will in any way fundamentally modify the course of the disease. Intervals of freedom from the eruption are probably not determined by it. Psoriasis associated with arthritis responds symptomatically as well as psoriasis without arthritis. For some unknown reason, the arthritis is materially benefited in about half the cases by treating lesions of the skin. A small percentage of cases with rather distinctive clinical manifestations does not respond well to the treatment. Its beneficial effect in exfoliative dermatitis secondary to psoriasis is unique. It is not recommended as a measure to be applied as a routine for a few patches of psoriasis as other efficacious methods are more simple, but it can often be used without materially interfering with the patient's work. The scalp and nails do not lend themselves to this method of treatment. It is a decidedly valuable method for clearing up temporary extensive and resistant eruptions of the glabrous skin, and practically always succeeds when various forms of treatment by roentgen rays, chrysarobin or other substances and methods have failed or are contraindicated. The principles of the treatment must be applied and the simple technic mastered, or success cannot be expected.

Physical Therapy in the Treatment of Diseases of the Ear, Nose, and Throat. T. H. Odeneal, M. D., Beverly, Mass., in Arch. Otolaryng., 14:1:64, July, 1931.

Surgical diathermy.—By the use of a small electrode, diathermy may be employed surgically to remove all forms of growth, no matter how large; it leaves a smaller scar and less contraction of the surrounding tissues than other methods.

Although I coagulate a great many tonsils, my method of choice is still the use of the knife. This is always the advice I give my patients unless some complication is present that contraindicates an operation, or, as is frequently the case, the patient does not wish to be absent from work for the necessary time.

Medical diathermy.—In the treatment of deafness I have found diathermy to be a valuable aid, and employ

it in all cases whether the high or low tones or both are affected. Its value is easily determined in those cases in which the eustachian tubes are patent, the high tones are slightly affected and the positive Rinee test is obtained. Diathermy is also effective in the exudative types of otitis media. I do not employ it in chronic suppurative otitis media, although it undoubtedly would be helpful.

I believe that diathermy is going to prove an effective remedy for acute rhinitis and that its use will become universal in the treatment for this common disease.

Diseases of the ear.—Ultraviolet therapy has been highly recommended for furunculosis of the ears, but I see no benefit derived from a thorough trial of this form of treatment in about fifty cases of this condition.

In cases of chronic otitis media with the absence of a large part of the drum, I have stopped the discharge temporarily by this means in a much shorter time than by other methods, and the relief has been of longer duration. If there is no large perforation, however, treatment is useless.

Eczema of the ear is markedly benefited by this form of treatment, but I have not effected a cure by this means.

Diseases of the nose and accessory sinuses.—Local applications by means of the quartz rods are markedly beneficial in acute coryza.

In chronic rhinitis of all types I have not obtained sufficient results from this form of treatment to make it worth while.

Vasomotor conditions of the mucous membrane of the nose have reacted better to screened ultraviolet rays than to the unscreened rays. This treatment has been successful in some cases, but fails completely in a large percentage.

I have given up irradiation in hay fever as I could see no benefit from it.

In diseases of the sinuses, especially in children, irradiation of the body with the air cooled lamp is without doubt useful. These treatments must be given so as to obtain a mild reaction of the skin, just sufficient to act as a tonic and increase the resistance of the patient to the infection.

Diseases of the throat.—Infectious ulcerations of the pharynx and tonsils seem to be benefited by local application of the quartz light, but I never depend on this form of treatment alone. Vincen's angina is unquestionably benefited by it and I believe it is a most efficient remedy for that disease.

Galvanism.—There is no question but that some persistent cases of chronic suppurative otitis media heal by electrolysis when there is an opening in the drum sufficiently large for the treatment to have an effect, whereas other cases do not seem to be benefited.

Galvanism is the best method of removing varicosed vessels of the skin, especially on the nose, since by the insertion of a fine platinum needle it is possible to end the vessel and destroy it with one ma. of current in one treatment.

Treatment of Hay Fever by Intranasal Zinc Ionization. Philip Franklin, F. R. C. S., Laryngolist, Italian Hospital, Infants Hospital, etc., in British M. J., 3677; 1115, June 27, 1931.

The uniformly successful cures that I have obtained with the method described below encourages me to place on record the technique I have adopted during the last six years.

The treatment consists of intranasal zinc ionization. Cases of hay fever have been successfully treated before and during an attack, as well as those of vasomotor rhinitis—that is, cases showing manifestations of hay fever throughout the year. The majority of cases require two treatments, with an interval of seven days. The number of treatments depends on the success of the intranasal impregnation with zinc. In some cases one treatment has sufficed. The intranasal mucosa is covered with thin layers of cotton wool soaked in a 1 per cent solution of zinc sulphate in distilled water. Particular care should be taken to cover the middle turbinate and the adjacent septal mucous membrane. A zinc terminal is placed in each nostril and connected with the positive pole of a galvanic battery. The indifferent electrode is applied to the forearm or hand. A current of three to five milliampheres is passed for fifteen to twenty minutes.

On removal of the packing the tissues are contracted, and the turbinal and septal mucosa are covered with a white coating which persists for several days. The treatment is not followed by any untoward symptom, although attacks of sneezing may occur during the subsequent twenty-four hours.

Three patients treated in 1925, one in 1927, and one in 1929, have been free from attacks and required no further treatment. The result is not always permanent, and although the patient may be free during the subsequent hay fever season, the attack may recur the following year.

Electrical Treatment of Neuritis and Writer's Cramp. W. Black Jones, M. D., Creigian, Cardiff, in British M. J., No. 3689, p. 531, Sept. 19, 1931.

The method adopted by Davies consisted, first, of testing for the affected spot. The second stage is that of treatment, and for this purpose the galvanic current is employed. A local anesthetic is next injected under the dermis, the needle is inserted, and the current is turned on; the needle is directed to the point where the pain is most acute. The current should not exceed six milliamperes; the needle is withdrawn after ten minutes.

A New Technic.

Having had an experience of nearly one hundred cases, I have modified the above technic slightly. The current used generally does not exceed one milliampere, frequently it is 0.2 milliampere. It is found that five minutes duration is sufficient for the treatment; frequently after four minutes the patient states that the pain is diminished. Two spots are often treated at one sitting.

As to the apparatus, a pantostat may be used, but for some years I have used four dry cells, which can be carried in a portable case. The weak secondary current of an induction coil gives the faradic current. Frequently one, two or three of the cells are used; more would cause unnecessary pain.

The general results of the treatment show that where one or two spots occur on a particular nerve the action of the current gives immediate and permanent relief. If the faradic current is again applied to the spot after an interval of a few days, and no pain is felt, it is concluded that the spot is cured. Thus no second treatment is necessary. Occasionally when a spot is found there may be felt under the skin a small nodule; this disappears with the application of the galvanic current; the nodule may be a deposit of uric acid. On the other hand, when a number of spots is multiple, and when they are close together, the results are not so satisfac-

tory and the relief is only partial, or it may be some time before a moderate amount of success is obtained; this is assisted by the internal administration of iodine.

Neuritis occurs usually in superficial nerves. When those near a joint are affected, movement is limited, and the joint becomes more or less crippled. In rheumatoid arthritis the pain is sometimes due to neuritis surrounding the joint; the above method gives much relief. Neuritis of the forehead and scalp is often very painful, and does not easily respond to medicinal treatment. Frequently one spot alone is responsible for all the trouble; in such cases the treatment gives immediate relief. In the forehead the nerve which is chiefly affected is the supratrochlear branch of the frontal nerve; this emerges from the orbit and supplies the lower and mesial part of the forehead. Of twenty-eight cases of neuritis of the forehead and scalp, this nerve was involved in twenty-three cases; in sixteen cases it was the only nerve affected.

Galvanic Current for Hemorrhoids. Letter to the Editor, Jour. A. M. A., 97: 6:410, Aug. 8, 1931.

A firm manufacturing physical therapy appliances in Chicago sponsors a proctologic clinic in which a treatment of hemorrhoids with galvanic current is advocated. Kindly express your opinion as to the value of the treatment. M. D., Illinois.

Answer.—Treatment of hemorrhoids with the galvanic current results in a thrombosis of the varicose veins, as occurs when phenol or quinine urea hydrochloride is injected into the internal hemorrhoids. Any one of these measures is valuable only in the treatment of internal hemorrhoids. In the average patient, therefore, it is fully as safe and much surer to have a well conducted operation for the removal of the hemorrhoids than to have treatment by any one of the methods mentioned.

Spastic Colitis. By Samuel J. Morris, M. D., Professor of Anatomy, West Virginia University School of Medicine, Morgantown, W. Va., in West Virginia M. J., XXVII:8:342-345, August, 1931.

The treatment consists, first, of absolute withdrawal of all cathartics, enemata, and irrigations so frequently indulged in by these patients. Give them a diet free from roughage and raw fruit as non-irritating as possible. Milk is to be avoided or else greatly reduced, as it tends to increase the gas formation. Meat is well tolerated and can be given in large amounts. Avoid foods with high starch contents. Fat contents can be high. Recognition should be given possible phobias frequently exhibited by these patients in regard to special foods. As the patient improves, other articles of diet can be added, such as chicken, rice, and fish. Fermented milks are well borne. The last items to be added to the diet consist of raw vegetables and fruits and those foods containing mechanical or chemical irritants.

In the medical line, castor oil may be given once a week in doses of one to two ounces, to clean out the old residues, mucus, and bacteria. In other cases, sodium phosphate or similar salts give better results. I have gotten the best results with the use of one quart of normal salt, (?) taken before breakfast.

The use of inert, bulky chemicals is helpful in supplying the necessary bulk to the intestinal contents. This accounts for the relief these patients sometimes get during the x-ray examination, due to the barium. The dose of barium used in these cases is a tablespoonful of the powder twice a day.

General sedatives are useful, such as bromides. For overcoming the spasm, atropin or belladonna in increasing doses is very useful. Begin with ten drops of the tincture three times a day, increasing one drop a day until symptoms disappear or ocular accommodation is paralyzed.

Uultra-violet rays are useful, and in some cases diathermy is of value. In some cases colonic irrigations are found valuable, but care should be used, as they may produce harm rather than benefit.

A Case of Taboparesis Treated by Hyperpyrexia Induced by Hot Baths. C. R. Gibson, M. B., Ch. B. Glas., and R. G. Gordon, M. D., Ed., D. Sc., F. R. C. P. Ed., in British M. J., No. 3675, June 13, 1931, page 1015.

Treatment

On April 29, 1930, the following procedure was adopted. The patient was weighed (stripped), and after five minutes rest on a couch the mouth temperature, pulse rate, and respiration rate were recorded. A sensitive recording galvanometer of the moving coil type was used to make a continuous graphic record of the rectal temperature. This apparatus was placed in the dressing room leading off the patient's bathroom. We could thus watch for any sudden rise or fall in the patient's body temperature, and at the same time observe his general condition as he lay in the bath.

The metal thermometer, containing a delicate thermopile, was inserted into the patient's rectum while he was resting on the couch. As soon as the temperature was recording steadily he entered the bath. This was an ordinary reclining bath, and it was filled to the brim with water at a temperature varying in different experiments from 106 to 110 degrees. A waterproof canvas cover was stretched across the bath and tightly bound down, there being a slot for the patient's neck, so that only his head was out of water. Heat loss from evaporation was thus cut down to a minimum; and an attendant, watching a thermometer in the bath, kept the temperature even by the addition of a little hot water as required. Five minutes after the patient had entered the bath the mouth temperature, pulse rate, and respiration rate were recorded. These readings were repeated five minutes before the patient left the water. The duration of each treatment varied from forty to fifty-three minutes. The patient was then wrapped in blankets and made to rest on a couch for one and a half to two hours. The mouth temperature, pulse rate, and respiration rate were recorded twenty minutes after he had left the bath; and the rectal temperature was recorded until the patient was ready to dress. He was then weighed again and the loss of weight noted.

During the nine months of treatment the patient showed a net gain of forty-seven ounces (9 st. 11 lb. 13 oz. to 10 st. 12 oz.), and at one time he actually reached 10 st. 7 lb. 1 oz. The treatment did not hinder him from going to his work. He left work at 4 p. m. and started his bath at 4:45 p. m. Then he left for home at 7:30 p. m. (by which time he had cooled down to 100 to 101 degrees), had his supper and went to bed; by next morning he was fit to resume work.

The results of this experimental treatment have been most striking. Until July there was no definite change in the patient's condition, though there did not seem to be any progression of the disease. The course of eight baths in July, however, produced a very marked improvement. This was noticed particularly by the patient's wife, who said that he was no longer depressed,

and only occasionally irritable. His speech was clearer, and his gait was slightly more steady. He was eating much better and his insomnia was gone. The blood Wassermann reaction at the end of July remained strongly positive. Baths were started again in October, and twelve were given by the middle of November. Steady progress, both mental and physical, was shown. The patient's employers remarked on the improvement in his work, and he felt that he was much less easily tired. We noticed a distinct betterment in co-ordinated movements, and he could get into and out of his bath unaided. Up till that time he had to be assisted on both sides, especially when getting out of the bath.

Commentary

It will be admitted that the symptoms of this patient have improved very materially. His reflexes and Wassermann reaction are so far unaltered. The cerebrospinal fluid shows signs of approaching a more typical paretic type, though the protein is definitely less and there is a slight diminution in the intensity of the Wassermann reaction. It should be clearly understood that we do not wish to draw any conclusions from this one case and we hope that others who have more clinical material with which to work may be induced to try this treatment and prove or disprove its utility. If it should prove successful, it has much to commend it when compared with other methods of inducing hyperpyrexia.

Swimming as a Therapeutic Aid in Negativism. John Eisele Davis, M.A., Senior Physical Director, U. S. Veterans' Hospital, Perry Point, Md., in Mod. Hosp., XXXVII:1:59, July, 1931.

This paper offers a technique for the specific purpose of promoting physical and mental adjustments in these patients so that they regain the fundamental habits necessary to a comfortable vegetative existence. The results achieved demonstrate that this treatment is not a panacea for all cases, but it is believed that it has a tendency to break down specific negativism.

As a preliminary procedure it is of course necessary to review the clinical data relating to the physical and neurologic examinations.

A special study was made of twenty-four patients who were subjected to this active water therapy at the U. S. Veterans' Hospital, Perry Point, Md. These were dementia praecox patients with the exception of one who had encephalitis lethergica. Ten were catatonic and twelve were hebephrenic types. Before the application of this therapy seven patients were tube fed and four were spoon fed; two patients had been receiving continuous tub treatments for months and sixteen were untidy in appearance. After two months' treatment, according to the nurses' notes and the ward surgeon's records, eighteen out of the twenty-four showed distinct improvement. All these patients were less disturbed and slept better. Those who had been spoon or tube fed were able to feed themselves, all were able to dress themselves, and this was done in most cases with despatch. One patient adopted a stereotyped position of the right arm which proved to be due to hysteria and the limb was restored to normal function through swimming therapy.

Thrombo Angitis Obliterans (Buerger's Disease). Russel Kessel, M. D., Charleston, W. Va., in West Va. M. J., XXVII:7:301, July, 1931.

Various Postural exercises have been advocated by Buerger and Claridge. The latter suggests elevation of the leg for one-half to three minutes to an angle of 60-90 degrees, then lowering it to the floor for five minutes, then allowing it to remain horizontal on the bed for from six to ten minutes. Repeat this on alternate hours. On the odd hours compress the artery for one minute and release for ten minutes. Local heat should be given, beginning at 120 degrees and slowly increasing to 180-200 degrees for one-half hour periods twice per day. The Bier suction treatment has been employed with beneficial results in certain clinics. The advocates of sympathectomy operations have reported large numbers of apparently successful cases and also a goodly number of injections of alcohol into the sheath of the vessels under procain anesthesia. Some believe that amputation is the only rational treatment where ulceration and gangrene have developed. Many who regard amputation as an ultimate necessity feel that it should be limited to the periphery, thus avoiding too radical measures.

Diathermy in the Treatment of Pneumonia. G. Simon, M. B., in British J. Radiol., IV :41:197, May, 1931.

Robinson recently published the results obtained at the West Middlesex Hospital, where he treated a large number of pneumonia patients with diathermy.

The results obtained at St. Bartholomew's Hospital were in keeping with Robinson's published results. From a study of the temperature, pulse and respiration charts, and the leucocyte count curves, there was no evidence of a specific response to diathermy.

Of course, in a certain number of cases, the temperature fell following the treatment, as was only to be expected in a disease with such a short and uncertain duration. In many cases, however, the general level of the temperature, pulse and respirations was unchanged during the time reckoned from the first treatment to the beginning of crisis or lysis. The complication of empyema often occurred in spite of diathermy treatment, even if it was continued after the crisis. No definite evidence is as yet available to show a definite decrease in the mortality from the disease.

Why, then, treat patients suffering from pneumonia with diathermy at all? The answer to this is that there is one fairly constant response to diathermy, and that is, the relief of pain. Unfortunately the degree and duration of this relief is very variable. Sometimes it is complete and lasting, at others partial and transient.

In this series of cases, diathermy was of more value in the relief of pain than any of the other methods used, which included antiflogistine, leeches, and omnopon. Associated with the relief of pain, the patient will feel more comfortable generally, and will tend to sleep better.

Therefore, when giving treatments, the technique should be that which will ensure the greatest relief of pain, with the least disturbance to the patient. No special attempt need be made to give the diseased lung the maximum amount of heat, as moderate currents are just as effective in relieving pain as currents as strong as the patient will stand, while a feeling of pleasant warmth is more restful than a feeling of heat so intense as to be almost burning.

Technique.—The leads must be well insulated, and not less than four feet or more than nine feet long. One pound lead is very suitable for the electrodes. Saline-soaked pads are contra-indicated, as they are messy if put on wet, and dangerous if used dry.

A terminal should be soldered on to the electrode, or fixed securely on in some other way. A lead slipping off would cause a very serious burn if considerable power were being applied. The size of the electrode will depend on the size and shape of the patient's chest, the

area where pain is felt, and the extent of the consolidation in the lungs.

7 x 5 inches, or 8 x 6 inches is usually the best size for an adult. The two electrodes must be of equal size. They are placed flat on the opposite sides of the thorax. The best position is when they are placed anteroposteriorly, because for reasons unknown, the results are not as good when they are placed on the lateral aspects of the thorax, even if the pain is mainly here. They may be placed in the mid line, either with the long diameter horizontal or vertical, and in the latter case they may be displaced slightly to one side or other of the midline.

The important thing is to get the electrodes opposite and, as far as possible, parallel to each other. As the thorax gets narrower toward the top, this is often difficult.

The simplest method of holding the electrodes in place is to let the patient's weight rest on the posterior one, while the anterior one is easily secured by a small piece of toweling on the top of it, and then stretching a long piece of flannel across that, the required tension being obtained by placing sandbags on the flannel, the sandbags resting on the bed between the patient's arms and chest.

It is absolutely essential that the electrodes should be warm when placed on the patient. The best way of ensuring this is to proceed as follows:—The lead is attached to the electrode, which is then smeared over with soap. It is then taken and passed two or three times through the flame of a spirit lamp, until it is at the desired temperature, as tested on the back of one's own hand. All this should be done at the bedside, and the electrode placed on the patient before it has time to cool. It is unnecessary to push the current up until it feels uncomfortably hot.

The patient should be told to indicate by some simple movement, e. g., raising his hand a little, if he feels it too hot. The patient must be carefully watched during the treatment, and the current switched off if it feels too hot, or if the patient gets a fit of violent coughing. In this latter case it is quite all right switching off the current on the primary main switch, and as soon as the coughing has ended switching on again straight to the maximum current value that was being used at the time.

The reading of the ampere meter is of no great value, as it does not indicate the heat generated, unless the power input or resistance of the patient is also known. However, it gives one a rough idea of what the patient will take next time. The feeling of comfortable warmth for electrodes 8 x 6 inches may be felt anywhere between .8 and 3 amperes, depending on the position of the electrodes relative to each other, how they fit on the skin, and the condition of the skin surface.

Diathermy appears to be of real value in the symptomatic treatment of pneumonia. There is no evidence of a specific response to diathermy, and it is probable that the benefit obtained is not due to the heating of the lung. A technique to ensure gentleness in the treatment should be adopted.

Quantitive Measurement of Diathermy Dosage. A. Hemingway, Minneapolis, Minn., in Radiology, xvii:1:136, July, 1931. (From the Department of Physiology, Univ., of Minnesota.)

Abstract.—Evidence is presented which shows that a thermocouple voltmeter together with a thermocouple ammeter would be suitable to measure diathermy heat dosage, since across the tissue the high frequency current and voltage are in phase. Experiments are reported on the heat production by diathermy currents in tissue which show that the heat imparted to the tissue can be computed from the effective high frequency voltage drop across the tissue and the diathermy current.

Conclusions.—The heat dosage of diathermy may be computed from the diathermy current and the effective voltage drop across the tissue. The heat energy imparted to a patient in a diathermy treatment in calories may then be calculated from the formula: Heat energy equals 0.24 EIt calories where E is the voltage drop, I the diathermy current, and t the time of duration of the treatment. This eliminates the necessity of measuring the high frequency resistance and computing the heat energy from the formula: Heat energy equals 0.24 I2Rt.

The voltmeter method of measuring diathermy dosage is very practical clinically since the only way that the usual diathermy machine has to be modified is to insert a portable thermocouple voltmeter in parallel with the patient.

Diathermia. By W. S. MacKenzie, M. D., Adrian, Mich., in Internat. J. Med. & Surg., 44:7:328, July, 1931.

The value of diathermia in the treatment of diseases and painful members is one field of the professional practice which has been neglected to a large extent by the general practice.

First, because its application and results are little understood, though the procedure is very simple.

Second, because of the expense of the equipment.

Third, because the manufacturer of this machine has sold to osteopaths, chiropractors, and everyone having the price regardless of their having a working knowledge of this valuable agent.

There are a few contraindications that must be observed in the treatment with this valuable disease destroying agent.

First, it should not be used where pus is encapsulated.

Second, nor where there is any danger of hemorrhage.

In the relief of pain resulting from a sprain I doubt if we have any agent equal to the use of diathermia.

I have treated cases suffering from this misfortune and seen the patient fall asleep while being treated and yet they had not been able to sleep for thirty-six hours previous to the treatment, because of the pain.

The caution in the treatment is not to increase the strength of the current too rapidly. It requires five minutes to build up the milliamperage from zero to such a degree as the patient says he feels it getting warm.

Hyperthermia in Ultrahigh Frequency Fields. Editorial in Jour. A.M.A., 97:5:323, Aug. 1, 1931.

The value of heating parts of the body by external devices has long been appreciated in relation to a variety of disorders. Localized changes in the circulation can be brought about, with evident benefit in suitable cases. Of late the development of febrile reactions within the body has been attended with quite different therapeutic reactions. The inoculation of certain types of syphilitic patients, notably cases of dementia paralytica, with malaria organisms, inducing fever thereby and consequent destruction of toxic agents, is one of the advances of modern medicine. A number of procedures for induction of febrile "attacks" have been attempted with some success. One method consists in exposure of the body to electrical oscillations of high frequency. Within such a field there may be marked production of heat throughout the body. The process can be perfectly controlled.

A group of investigators at the Albany Medical College have studied the effects of high frequency oscillators. These are constructed on the principle of a short

wave radio transmitter, except that the energy is concentrated between two plate electrodes instead of being directed from an aerial. Previously it had been noticed that when a workman was in the field of a short wave radio transmitter a rise of temperature of as much as 2.2 degrees developed in fifteen minutes, the height of the rise being determined by the time he remained in the field or by his proximity to the apparatus.

According to the most recent observations on small experimental animals, exposure to an ultrahigh frequency field for periods of from one half to one hour daily and raising their body temperature to 40.5 C. (104.9 F.) does not seem to retard their growth appreciably. The reproductive organs in the male and female are not appreciably affected, so that there is no loss of power to breed. Repeated exposure to an ultrahigh frequency field in which the body temperature is raised to 40.5 C. does not produce any abnormal pathologic lesions. It is not difficult to raise the body temperature still higher. The temperature returns to normal quite rapidly unless the animal has been heated above 42 C. (107.6 F.). Animals heated above 42.5 C. (108.5 F.) for any great length of time do not survive treatment. When such high body temperatures still compatible with life are attained, the results are such as one would expect from the consequent concentration of the blood. These are readily overcome. There is oliguria and the blood shows a high content of many catabolites, as would be expected from the heightened metabolism of the induced fever. There is an increase in red blood cells and in total white cells. Besides the increase in red cells there is in many instances a marked increase in immature forms of red cells, suggesting a stimulation of the hematopoietic tissues. The possible therapeutic applications of hyperthermia thus produced through purely physical means are now open for study. The dangers and limitations have been determined by the preliminary investigations. The procedure seems somewhat safer than the induction of fever of infectious origin. Jacobsen and Hosoi point out that the ease with which high frequency heating produces congestion of the extremities suggests that it may be of value, when cautiously used, in the treatment of certain forms of peripheral ischemia, such as occurs in Raynaud's disease, Buerger's disease and arteriosclerosis. The susceptibility of the male germinal cells to heat must never be overlooked. The use of fever as a therapeutic agent seems almost grotesque to the layman who has been accustomed to combat rise of temperature with antipyretic drugs. Perhaps hyperthermia will come into fashion; at any rate, the ease with which the temperature can be controlled in the high frequency field and the character of some of the tissue responses suggest possible therapeutic application. At the same time the extreme danger of quackery in the use of a potent electrical device needs to be emphasized. The Albany studies contain ominous warnings about undue hyperemia. The morphologic changes occurring in the tissues were congestion of the organs, peripheral hyperemia, cloudy swelling, fatty degeneration, dehydration, glycogen depletion, focal hemorrhages, especially in the gastro-intestinal tract, epithelial hyperplasia in the parenchymatous organs, and stimulation of the bone marrow. Following prolonged periods of heating, degenerative lesions occurred in the male germinal epithelium.

Guided Exercises Urged for Convalescent Paralytics. Abstract from Physical Therapy Section of Penn. M.J., xxxiv:12:898, September, 1931.

The United States Public Health Service, on August 18, advised that the restoration of infantile paralysis victims and the prevention of deformities after the acute stage of the disease may be best accomplished by carefully directed exercise, rest, and mechanical relaxation of the affected muscles under the supervison of a competent physician.

As soon as the patient's legs can be moved freely without pain, the training of the muscles should be begun. This period varies. In some instances it will be three weeks after the initial attack; in other instances, after a much longer period. Much can be accomplished for patients who have been neglected for years.

Premature manipulations and ill-directed exercise may greatly retard or prevent the maximum recovery of which the patient is capable, for instance, allowing patients to stand on their feet too soon. The patient cannot be too carefully watched to prevent toe drop, toeing out, sagging shoulder. This duty falls beat on the parents, who must first be trained by the physician, who should guide in prescribing the exercises, and changing them as the muscles become stronger.

According to the advice of the Service as published in the United States Daily, it should never be left to the patient to do his exercises alone, even when he is old enough to understand his own case. The response of muscle and nerve is dependent on the strength of the stimulus, and the volition of the patient is greatly aided by the outside stimulus of a word of command.

When a muscle does not function at all it is a help if the physician puts his hand on the muscle to be contracted and performs the movement passively, while urging the patient to make the greatest possible effort. This is not what is usually understood by the term "passive movement," because as far as the patient's will is concerned it is active.

The patient's mental attitude is always the first obstacle to be overcome. Whoever directs the exercises should discourage "I can't," and make the patient feel that "he never has, but he is going to." If they are going to be a success at all a great amount of faith and enthusiasm is necessary on the part of the physician or parent who oversees the exercises.

While performing the exercises the paralyzed limbs should be uncovered, as the action of the muscles cannot be accurately observed through clothing. When the paralysis is extensive, the patient, if a young child, should be entirely undressed for the treatment.

A table or other hard, smooth, horizontal surface, preferably not the floor, is absolutely necessary for the proper performance of the exercise as it eliminates as much as possible the resistance of friction and enables a weak muscle to perform movements which would be wholly impossible for it on a soft yielding surface like that of a bed or couch. The table should be wide enough to allow the full sweep of the leg in hip abduction when the patient is lying on the back, or in hip flexion when lying on the side.

In some cases movements can be more easily made in warm water, or in warm salt water of increased buoyancy. It is usually best, however, to do the real training on the table, where the motion and position can be accurately supervised, leaving the water exercises for patients who have learned the movements which they need to practice and those which they need to avoid.

In all exercise periods, the whole attention of the patient should be required, or his ability to use his muscles will be much underestimated and the exercises will be much less effective. For this reason it is desirable that no person except the one who directs the exercises should be present. The presence of other

children should be absolutely prohibited and no toys should be allowed. If the parents are ingenious the exercises themselves may be turned into an interesting game, without on that account making any sacrifice of precision in the performance of them.

The exercises are given in order of progression from those which the weakest muscles are capable of performing to those which require normal strength. In fitting the exercises to the patient, each group of muscles must be tested as to what it can do, and given as hard an exercise as it is capable of performing without fatigue. As soon as the muscles outgrow the exercise first given, it should be discarded and the one next in order of strength should be taken up, and so on.

In all exercises and positions the stretching of weakened muscles is to be carefully avoided.

Sacro-Iliac Pain. Clinic, Lawson Thornton, M. D., Atlanta, in J. M. A. Georgia, XX:8:320, August, 1931.

Treatment should always be conservative at first. The joint may be immobilized by any plan desired,—adhesive strapping, belts, or corset.

Postural changes by training or by means of braces may remove straining thrusts and thereby relieve pain. Exercises and general hygiene may improve muscle tone and relieve relaxation of the joint which may follow prolonged disease. Such a relaxation may follow pregnancy and labor.

Foci of bacterial infection, of course, should be sought for and removed. Diet and elimination, plus the general hygienic and hydrotherapeutic regimen which one employs in the treatment of toxic arthritis should be given consideration.

When it is realized that the problem is a recurrent or chronic one, an operation for fusing the joint is indicated. Relief of the joint pain may be expected almost immediately after the operation, and the referred pain a short time later. The true sciatic neuritis could not subside so readily. One would expect a slower healing process.

At first we were at a loss to know why the pain is relieved so soon after the operation. Certainly the joint cannot become fused in less than several weeks. So another cause must be found. The sensory nerves that supply the sacro-iliac joint pass across the posterior edge of the joint along the sacrum. The operative dissection cuts across these sensory nerves, and evidently relieves the joint pain. Later the joint fuses, the arthritis subsides, thus removing the inflammatory process adjacent to the sciatic nerve. Eventually the nerve itself recovers.

The Relation of Pelvic Inclination, Lumbar Index, and Posture to Obstetrics. Cleary Swanson, M. D., Detroit, in J. Michigan M. Soc., XXX:9:684-685, September, 1931.

Drs. Dickinson, Miller and others have recognized posture as a very important gynecological factor and I wish to point out its relation to pregnancy, which is an extremely frequent cause of abnormal postural development. As the uterus increases in size the abdominal muscles become stretched and thinned out. With the conclusion of labor the abdominal contents suddenly are reduced. The abdominal wall at times, however, regains its tone extremely slowly. When after ten to fourteen days the patient assumes an upright posture, the abdominal wall is still relaxed, allowing the abdominal contents to prolapse into the lower abdomen and pelvis. The upper abdomen becomes flat, the chest begins to droop and the beginning stages of poor posture are established.

Static backache is about two and one-half times as frequent in the multiparous as in the primiparous women. This condition is best prevented by a series of graded exercises starting soon after the patient is delivered. We start them after 48 hours with head raising exercises and then about the eighth day have them assume the knee-chest position for five minutes night and morning. In this series, 160, or about two-thirds, complained of some degree of backache, while one-half of these had the severe type. The patients with above average lumbar index and pelvic inclination had severe backache more frequently than the others. This type of backache during pregnancy is usually best relieved with a well fitting maternity corset and after delivery by a sacro-iliac belt.

It was impossible to gather data on the relation of pelvic inclination to perineal lacerations in primiparæ, since the variation in the bisischial diameter, performing epsiotomies, etc., complicate this problem. It does seem logical, however, that an increase in the pelvic inclination should prolong the second stage of labor by preventing complete flexion of the descending head. Delayed engagement of the head in primiparæ with normal pelvix is probably due to high pelvic inclination. There were twice as many operative deliveries in those women with a pelvic inclination above 42 as in those under this figure. The position of the fetus in utero was not markedly altered by the pelvic inclination although there was a tendency to posterior position in those with above average inclinations. The only case of transverse position occurred with a pelvic inclination which really delays parturition.

It would seem that measurement of pelvic inclination with the kleiseometer is more accurate than measurement of the lumbar index and as more work is performed with this instrument it will probably replace the lumbar index.

Conclusion

There are, to be sure, many factors that affect the length of labor other than pelvic inclination but it does seem as if a high inclination really delays parturition. The lumbar index is of value in the study of postpartum retroversions since it helps differentiate the congenital type, operative correction of which does not give the patient relief from her symptoms.

Physical education has in a general way pointed out the relationship between posture and various pelvic symptoms. All pregnant women have a tendency to develop poor posture following delivery and should be given a series of exercises to prevent this condition from occurring.

Should the Hospital Furnish and Maintain Adequate Physical Therapy Service? Harry Leslie Langnecker, M. D., Associate Professor of Medicine, Stanford University Medical School, in Western Hosp. Rev., XVII: 5:12, July, 1931.

Physical therapy is nearing the status of a recognized adjunct in medical practice. The public, therefore, has a right to expect guidance from the regular medical profession on its rational aspects, both beneficial and harmful.

The outstanding physical procedure is phototherapy—the application of visible light—in its various phases in medical treatment. Apparatus has been evolved to produce artificially, sunlight or a predominance of rays a

either end of the spectrum—the infra-red or the ultra-violet.

Diathermy is the convenient method of producing heat in the body tissues—deeper than the surface. While scientific research does not confirm the conception generally in vogue in the medical profession, still there is an abundance of clinical evidence that physiological effects, such as active hyperæmia, artificial pyrexia, analgesia, antispasmodic, bacteriostatic and absorptic influences, are induced. In electro-coagulation, desiccation and electro-thermic dissection the surgeon finds better, more skilful and safer methods in his work.

The role hydrotherapy plays in medical treatment is generally recognized. What would the sanatoria and asylums do without this hospital facility?

The production of a hyperpyrexia by a hot bath is the simplest, most economic, and least harmful procedure that has been developed. Under ordinary medical supervision, proper thermocouple contro, and thermometer recording, artificial hyperpyrexia has demonstrated favorable results in human ills heretofore unresponsive to the best known medical treatment. A specially devised tank or outside pool—under temperature and flow control—for the treatment of anterior poliomyelitis patients in the post paralytic stage, is another method by which reconstruction to the maximum degree is accomplished.

Another phase of physical therapy too often neglected or unrecognized, although it is the culmination of effort, the goal toward which the physician directing the physical treatments is aiming, is restoration of function. Exercise therapy may be anything, assistive, mechanical, educative, which will bring about normal function from disfunction. There must be a director who recognizes or can understand the physical therapy prescription to accomplish this end. This is the most difficult phase of the "curative" work.

An adequate physical therapeutic service in a hospital should have a central plant, but in the surgery, various out-patient clinics, psychiatric and pediatric wards, such equipment should be available as is essential in administering the treatment desired.

The first essential in furnishing efficient physical therapy service is to have a physician in charge as director of physical therapeutics.

It is not justifiable to shove the responsibility upon the technician. Hospital administrators would do well to consult a physician qualified to advise in this branch of medical treatment in planning such a service or purchasing physical therapy equipment. Architects do not comprehend the medical viewpoint nor will the business representatives sidestep the sale of his apparatus. Too many departments are poorly arranged for efficient work.

The educational importance of an adequately equipped physical therapy department in a hospital, under competent medical supervision, cannot be ignored.

In the small hospital, the furnishing of rational physical therapy is a real community service. To the physician who cannot afford to install the equipment, it gives him the needed assistance so helpful in his practice. In such hospitals it is easier to have a blood count or a radiograph, than a properly administered physical therapy equipment. To the people, the hospital would be truly a health center.

The greatest responsibility in educational progress in physical therapy rests on every teaching hospital. How many of the medical administrators here present received training in physical therapeutics in their undergraduate medical course? How have you acquired your knowledge? Since the establishment of the Council of Physical Therapy there has been a noticeable decrease in the commercial educating propaganda and a marked increase in teaching within the medical profession.

The hospital serves the community through its medical staff. The hospital must furnish facilities to its medical and surgical staff, or the regular licensed physicians of the community which will best care for the health of the people.

Features of Therapeutic Pool of New York Hospital. Joseph D. Flick, Supt. Hospital for Ruptured and Crippled, New York, in Hospital Management, XXXII:2:30, Aug. 15, 1931.

We call the swimming pool at the Hospital for Ruptured and Crippled a "therapeutic pool," as the main object of the pool is not swimming, but to give proper exercise in the water, to children and adults, with the object of muscle reeducation and general development of the body, and for patients suffering from infantile and other forms of paralysis, arthritis and other diseases. Exercises as a therapeutic agent are based on solid scientific principles. Exercises in the water are based on the well known principle of hydrostatics that a body submerged in water loses weight in direct proportion to that of the displaced water. The patients are able to perform exercises under water that they would not be able to do out of the water.

The pool is twenty-six feet long, twelve feet wide, the depth increasing gradually from two to four feet. The pool is not sunk as usual, but is waist high so that crippled children and adults may be helped easily into the water. The tiles are of the non-skid varieties. A table placed in the pool is submerged in the water to allow the patients to exercise their limbs in the water. The water is filtered and sterilized with ultraviolet rays. The temperature of the water is from 90 to 95 degrees. To help the patients to exercise in the water, a trolley is suspended to the ceiling of the pool.

Excessive Ultraviolet Irradiation. Abstract in Jour. A. M. A., 97:1:60, July 4, 1931, from Am. J. Dis. Children, 41:775, April, 1931.

Hess and Smith irradiated two series of rats with the mercury vapor lamp for a period of from five to six months or gave them viosterol. Male as well as female animals were used. Those in the first series were littermates; those in the second series, although not littermates, were the progeny of the first. Three intensities of irradiation were given, mild, moderate and severe. The viosterol was given in small as well as in excessive amounts. The main object of the experiment was to note whether prolonged and intense irradiation or large doses of viosterol had a deleterious effect on the animals, as evinced by the rate of growth and by the size and appearance of the endocrine glands. The growth of the animals subjected to marked intensities of ultraviolet irradiation or given large amounts of viosterol was as good as that of animals which had lived under similar conditions but had not been subjected to irradiation or given viosterol. No difference was noted at necropsy between the endocrine glands of the treated and those of the untreated animals.

Penetration of Light Through the Human Skin. Abstract in Jour. A. M. A., 96:25:2156, June 20, 1931, from Am. J. Physiol., 97:86, April, 1931.

Bachem and Reed state that visible and near infrared rays are strongly absorbed by the blood of the corium and subcutaneous layers, with direct effects on the blood

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to be expected. The heating effect must be rather mild on account of the small absorption in the epidermis and the strong convection of the blood stream. The infra-red has little penetrating power. Most of it is absorbed in the epidermis. The heat produced is slowly conducted away by the blood stream and by the air. Over-exposure of the germinal layer may lead directly to blistering. There is greater variation in percentage penetration of ultraviolet than in other parts of the spectrum. At 280 millimicrons the absorption in the corneum and prickle cell layers is pronounced. The great antirachitic effect of this wavelength must occur in or about these layers. In both sides of this band, near 300 and 250 millimicrons, the penetration is greater, more radiation reaching the stratum malpighii and the corium. These observations indicate that erythema production occurs in the germinal layer (or the corium) under the shadow of the upper layers. The stratum corneum and granulosum must play an important part in the light protection of these sensitive layers. From 250 millimicrons down the absorption in the horny layer increases rapidly. Near 200 millimicrons the absorption is so complete as to prevent any radiation from reaching the living layers of the skin.

Ultraviolet Irradiation After Roentgen Therapy. Letter to the Editor, Jour. A. M. A., 97:9:663, Aug. 29, 1931.

To the Editor:—Will you please advise me as soon as possible whether there is any contraindication for ultra-violet treatments following roentgen therapy. The particular case that I have in mind at this time is one of epidermophytosis of both hands in which five sixths of an erythema dose has been given, 5 milliamperes, 120 kilovolt peak, 1 mm. aluminum filter, 30 cm. distance.

M. V. Fahey, Indianapolis.

Answer.—There is no contraindication for the use of ultraviolet treatments following roentgen therapy. At one time ultraviolet radiation was rather widely used as a treatment in roentgen burns and at that time was considered helpful. The recent consensus seems to be that there are no beneficial results in treatment of excessive roentgen dosage.

Use of Colored Lights. Letter to the Editor, Jour. A. M. A., 97:6:411, Aug. 8, 1931.

Of what value are the use of colored lights or colored slides in front of sun lamps or infra-red lamps as a therapeutic aid in underweight, nervousness, goiter and other diseases? A. Wessermann, Washington, D. C.

Answer.—According to the available evidence, there is no clinical or experimental proof that colored lights or light transmitted through colored filters have any therapeutic or curative effect on the human being. Claims that transmitted infra-red rays through red filters to reduce burning of the skin yet irradiate the body with penetrating infra-red rays for therapeutic effect require additional experimental proof. Research, in which evidence is presented that rats grow larger under red lights, has not yet been confirmed.

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